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THE TEACHING OF OBSTETRICS.

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THE effect of anæsthesia and Listerism upon obstetrics lagged behind the impetus that these factors gave to surgery, and it is only the past twenty or thirty years that have witnessed the repercussions of aseptic principles upon the science and art of midwifery. Today this department of the medical curriculum is more and more occupying the minds and endeavours of all those concerned with the instruction of students. In fact public interest and conscience have been so bestirred that there is an increasing demand for thoroughly adequate instruction and experience in obstetrics.

The attainment to power of radical governments has resulted in a generous expenditure of public moneys upon sociological projects having as their objective the succour of the indigent sick and the long needed elimination of the handicaps that beset the starting point of so many lives. Antenatal care, mothercraft and baby welfare centres constitute the most definite improvement in medical procedure of this century; in no other department of medicine have such fundamental changes and sustained progress been made. They, collectively, are a new and important branch of preventive medicine which, because it aims at recognizing the abnormal in its infancy, may rescue us from the sterile routine of treating mature disease. Gradually, indeed, we may come even to detect those slight deviations from the normal which must herald the morbid state. The advance of feminism and the participation of women in all activities of life have added weight and momentum to the demand for greater concern for the mother and her child. *Pari passu* the expenditure of feminine nervous and physical energy in all manner of social, political, philanthropic and athletic endeavours has undoubtedly produced two results: a reluctance to bear children, so that it has become increasingly

necessary, for the welfare of the State, to succour and protect infant life that the population be not too much depleted; whilst these same activities have also rendered women less fit to accomplish the act of normal childbirth.

Pregnancy and parturition call for great expenditure of physical and nervous reserves which today are encroached upon by all manner of extraneous demands. Prior to their modern predominance, women were in a measure sheltered and able to conserve their energies for the birth and upbringing of the large families that were then customary. Whether the change is desirable, does not concern us so much as the facts that women are less capable of unassisted childbirth, that in both pregnancy and parturition the pathological is encroaching upon the physiological, that women's resistance to the deleterious consequences of these states has lessened and that the phenomena of nervous exhaustion and fatigue are much more prevalent. It is these factors, the encouragement of radical legislation, the demands of educated womanhood and the pressure exerted by the derangements resulting from the nervous expenditure demanded by modern life that have thrust to the forefront the question of improved obstetrics.

Although the public and parliaments are more and more aware of the need for thorough obstetric training, it is fair to say that the universities lag behind. With exceptions there is a reluctance on the part of those primarily concerned with the education of medical men to admit the claims of this branch of the curriculum that has long been regarded of quite subordinate importance.

Obstetrics is peculiarly suited for both parliamentary and academic regulation and organization, for it is a science that should have few crises. It is impossible to foresee the perforation of a duodenal ulcer, the gangrene of an appendix or the strangulation of intestine, but it is possible to detect the untoward phenomena of pregnancy and parturition. Surely it is possible to provide adequately for an episode that gives nine months' notice of its approach. Again, obstetrics is not today the mere holding of a watching brief at the bedside of a parturient woman; it should survey the mother from her first ovulation to the menopause. With its sister science of gynæcology it is responsible for the welfare of women before fertilization, during pregnancy and parturition, and until she returns to a healthy, normal life; joining hands with pædiatrics, it pilots the infant through the early years and so back again, full circle, to puberty. Whether we begin with the hen or the egg, the true obstetrician is concerned with every phase of feminine life except, perhaps, her autumn and winter years.

It is impossible in this paper to discuss the relationship of obstetrics to general medicine, but it is very intimate and important. The interaction the one with the others of the function of child-bearing and endocrinology, focal sepsis, organic, cardiac and pulmonary lesions, nervous dysfunction and neuropathic disorders are but a few examples of this important subject.

The value of efficient obstetric training and experience to the young practitioner cannot be overestimated. The student is apt to regard the subject as relatively of little importance. He knows that it takes a secondary place in his curriculum and is disposed to devote to it only that minimum of time necessary to satisfy his examiners. Later, launched on the uncertain sea of general practice, he may realize that his success depends upon his obstetric skill. Problems in medicine and surgery usually allow breathing space for reference to authorities, but the unwary obstetrician can easily meet a Waterloo that may be vital to his professional reputation.

With this apologia, with no shadow of criticism of any existing system, with no unhappy comparisons, but with the realization of the importance of obstetrics and a belief that the student's training therein is not adequate, this paper hopes to press into more stable and solid form ideas that have effervesced in the mind of the writer ever since he visited many of the leading obstetric departments of Great Britain and Europe.

It has all been said before, and better said, but reiteration can be wholesome as well as damnable, for, in the words of Lord Moynihan, "Ideals are for pursuit, not for attainment."

The organization of an obstetric unit will be considered under three sections.

THE STAFF.

The Professor.

The professor or executive head of the unit is responsible for the organization of the department, the allotment of duties, the standard of instruction and for the systematic lectures. He is the link between the unit and the academic authorities; by his persuasive powers they must be induced from time to time to afford additional facilities for obstetric investigation and studies. He is the final referee in times of difficulty or dispute and upon his justice and tact as well as upon his skill rests the smooth working of the department. With the increasing State and other control of motherhood, he will come in contact with official organizations and act as liaison officer between them and the university. He will become the principal agent to link together into a harmonious and economic whole the discrete philanthropic bodies that now independently contribute to the sum of maternal and infant welfare. He should be responsible for the direction of research into the problems of obstetrics, encouraging and suggesting individual efforts and promoting combined research by students, under- and post-graduate, in different but dependent departments, such as those of the biochemist, the bacteriologist and the clinician.

The professor is responsible for the preparation and delivery of the systematic lectures and also for as much of the clinical teaching as he may desire or find time for.

It is to the advantage of all, both junior staff and students, if the professor takes a regular and active part in the clinical work, for to him must be referred the difficulties and problems that arise so that his riper experience may find a solution and that he may give instruction.

Assistants to the Chair and/or Tutors.

The amount of ancillary help that the professor may need depends upon the size of the medical school. It is essential that the fifth and sixth and possibly also the fourth year students shall receive regular tutorial instruction. In small medical schools with, say, thirty students engaged in their final studies, not less than two tutors are necessary. In schools of this size it is probable that the assistants to the chair would undertake the tutorial instruction; in larger faculties it is wiser to augment the staff by the appointment of assistant obstetric surgeons, in addition to tutors, who would have access to clinical material and regard their position as a stepping stone to that of assistant to the chair.

The tutors would be expected to undertake the duties of registrars, making themselves responsible for the maintenance and filing of all case records, research memoranda and other documents appertaining to the work of the department.

The Technician.

A laboratory technician should be at the disposal of the department to carry out the routine and laborious work inevitable in any thorough investigation or research. It is an uneconomic waste of time to ask any investigator to undertake, say, the cutting of serial sections of tissues or the preparation of culture media.

The Research Student.

The unexplained problems of obstetrics are numerous and increasing and it is of prime importance that research should be encouraged and assisted. Individual efforts have already contributed much to our knowledge, for example, the work of Blair Bell, Eardley Holland and Mellanby which must command our respect and admiration; but perhaps of even greater value are systematic and organized efforts.

Whenever possible, the endowment of a research scholarship that would insure the maintenance of regular work in the hands of promising graduates, is a consummation to be sought. The interest of the public in the question of maternal mortality may encourage the beneficent to endow such scholarships, a bestowal of riches that cannot easily be bettered. Whilst recognizing the claim of the cancer problem, it is difficult to understand the consistency of such a great expenditure upon a disease mainly afflicting the veterans, whilst the elucidation of problems that beset the recruiting of the race is so starved of financial support.

THE EQUIPMENT.

The Hospital.

The hospital, the source of the clinical material, may be a separate institution or a department of a general organization. The latter is much to be preferred on all grounds; it is economically and clinically advantageous to have the maternity beds in touch with other departments of a general hospital. The proximity of laboratories, X ray facilities, specialists in medicine, ophthalmology, hæmatology, immune therapy and so forth is an enormous advantage to the obstetrician. Administration is simplified and rendered less costly by the use of common kitchens, laundries and stores.

The nearness of maternity work to their other studies enables the students to avoid waste of time often entailed in travelling to an independent and possibly distant institution.

The number of beds required depends upon the demand, but given a general hospital of five hundred beds, not less than forty should be available for obstetric purposes including antenatal observation which will require ten. The beds should be accommodated in small wards of about five beds each, an arrangement that allows of segregation, classification and disinfection without dislocating the work of the department. Associated with the wards there should be:

1. An admission block. In these most essential antechambers patients on admission can be questioned, pulse and temperature may be recorded, suspected pyrexia may be investigated, personal clothing may be stored and baths given.

2. A labour room for the early stages of parturition.

3. Delivery theatre for actual delivery. This must be planned upon lines similar to the best of surgical operating theatres.

4. Recovery room for patients after anæsthesia before removal to the ward.

5. Nursery for bathing infants.

6. Isolation block with its own kitchen, operating room and staff for the immediate segregation of suspect febrile cases both from the wards and from the admission block.

7. Clinical laboratory for the routine examination of urine. Bacteriological and hæmatological investigations are better conducted in the pathological department by its staff of experts.

8. Residential accommodation for students that they may be in constant touch with the whole routine of obstetric management and not merely present at deliveries.

Domiciliary Obstetrics.

The addition of district midwifery to the work of a maternity hospital increases greatly the educational value of the unit. Such work trains the student for the domestic attendance that will be expected of him in practice; it teaches him with the assistance of a trained nurse to adapt the scanty resource of the humbler homes to his needs and to

improvise a technique as consonant with his hospital training as circumstances permit. It affords a training in the management of patients and of their anxious and importunate relatives, the necessity of infinite patience and a foretaste of the self-abnegation that is demanded from all those who practise the science and art of midwifery.

The Clinics.

The clinics constitute the out-patient department of the maternity work. Antenatal and postnatal clinics are held regularly with possibly the addition of a pædiatric clinic for infants under six months of age. The association of pædiatrics with the obstetric out-patient clinics is gradually increasing in Europe and America. It is very desirable that students should be trained to meet the many difficulties of early infancy that will confront them in practice; and, moreover, such a clinic fills the gap that so often exists between the maternity and the children's hospitals. It is often in the charge of a pædiatric physician who works in happy association with the obstetric staff. Attendance of all prospective patients at the antenatal clinic should be made compulsory. This is not difficult if their admission to the hospital is made dependent upon regular examinations during pregnancy. On the other hand, no compulsion can be used to assure postnatal examination and it is everywhere found difficult to induce women to report. It is a matter for personal persuasion and tactful management of the clinic. An increasing number of women are appreciating postnatal facilities for an assurance that their delivery has left no morbid sequelæ.

The Museum.

The obstetrical museum should be an essential factor of the unit. Its function is to preserve pathological material, to record the abnormal and also to display at best advantage specimens illustrative of normal conditions. It has to be an anatomical, a physiological and a pathological collection. For the purposes of teaching the whole range of normal pelvic morphology and normal obstetric states should be collected as well as the morbid. It may be given an added interest by including an historical section dealing with old instruments, books, diagrams *et cetera*.

Although it can be made invaluable as an aid to instruction, the museum is too often a much neglected component of an obstetric unit. In many universities, except for a few specimens to be found haphazard in the general pathological museum, there is no provision for a separate obstetric collection.

The museum should be incorporated in the unit and should specifically serve its needs. In it or in an annex of it there should be provided obstetric dummies, mummified fœtuses, skeletal pelves, fœtal skulls and the necessary instruments for the practice of forceps delivery and the study of the mechanism of labour. The museum in the Obstetrical Department of the University of Liverpool is a fine example of the result of industry and enthusiasm. It is comprehensive, well arranged and of the very greatest assistance to the teaching staff.

With the cooperation of a maternity hospital with the general practitioners it is not difficult to build up a satisfactory collection which adds an interest to classes and provides texts for tutorials. It is deplorable to contemplate the waste of good material that must take place unless persistent efforts are made to establish a museum.

The Lecture Room.

If possible, a lecture room of dimensions sufficient for the number of students, but not so large that the audience is lost in a wilderness of benches, should be part of the unit. Its layout needs no elaboration but generous blackboard space and a lantern or epidiascope are essential.

The Laboratories.

There should be a museum laboratory for the preparation and mounting of specimens and a research laboratory properly equipped and having an attached animal house.

In small centres these can be combined, provided that the space is sufficient to insure uninterrupted facilities for the research work. Adjacent to the laboratories there should be the necessary equipment for photographic work, dark rooms, cameras, microphotographic and enlarging apparatus *et cetera*.

The Clearing House.

It is important that there should be a "nerve centre" for the unit. This takes the form of a room that subserves the combined requirements of a record office, library and common meeting ground. In some units it is the professor's room to which the staff has access and in which light refreshments are not unknown. Herein are compiled and preserved the records of the unit, statistical graphs are maintained and the results of collective research revised, amended, expanded or prepared for publication. Such an integer in the scheme not only eliminates waste and confusion, but also provides the happiest of meetings grounds where the staff can review, criticize and originate work.

THE METHODS.

The Curriculum.

The demands upon the three years that the student devotes to his clinical instruction are so great and so varied that it is not easy to apportion justly the time between the subjects to be studied. Medicine, surgery, pathology and a host of ancillary subjects claim recognition, whilst obstetrics is too often subordinated to a degree that is unwise. The claims of even medicine and surgery must not be allowed to filch from the study of midwifery its fair and just allowance of time.

It has already been emphasized how vital to the public and to the practitioner is an efficient training in obstetrics. In many curricula the training in practical obstetrics is interfered with by the

necessity of simultaneously attending lectures in other subjects. This tautochronistic work is distracting and it should be the aim of all those concerned with the instruction of students so to arrange the curriculum that the student shall be able to devote himself for a space of not less than three months entirely to the study of obstetrics and gynæcology.

It is not a great deal to ask that these subjects should be allotted one-eighth part of the nine terms of the student's clinical career. The student should live in an atmosphere of obstetrics, he should have time to follow a patient from the antenatal clinic to the labour ward, through convalescence to the postnatal examination. As things are today in many universities, it is impossible for the student to compile a complete obstetric case record; his studies of the subject are so disjointed that he cannot observe his patient from start to finish.

The idea that obstetrics consists of the study of a woman in labour and for ten days after must yield to the proper conception of the science that the fertile woman needs attention from conception of her fœtus to weaning. When this fortunate consummation is achieved, it is to be hoped that the demands of the obstetric teacher will be admitted and catered for.

In Adelaide Dr. Wilson has attempted to solve the problem by requiring residence at the maternity hospital during the vacations. The plan has worked well, but it is likely to become mathematically impossible with the increase in students that marks the junior years. This scheme does, however, enable students to enjoy a period of practical midwifery without the distraction of academic or any other work.

The difficulties of accomplishing the ideal vary in every centre; their removal is a local affair that precludes the possibility of setting out in detail a curriculum, but certain fundamentals can be formulated:

The Systematic Lectures.

Careful tabulation of the subject shows that to cover the ground satisfactorily not less than thirty-six lectures in obstetrics alone are necessary. This can be achieved by the delivery of two lectures per week throughout two terms of the fifth year and before the student enters upon his practical obstetric work. Prior to the lectures students should receive a short series of tutorials dealing with the elements of the subject such as presentations, positions, lie and mechanisms. This familiarizes them with the subject, makes it easier for them to follow the lectures and accustoms them to the nomenclature of obstetrics.

There has been a good deal of discussion about the value of systematic lectures, but inquiries among many students show that they are necessary, but of varied value to the listeners. Some students possessed of auditory memories benefit materially, whilst those whose memories are more visual, regard them as waste of time.

Lecturers should aim at not merely paraphrasing the text book, but at introducing a more personal note so that the audience may obtain a conception of the subject from a different angle. Lectures, carefully prepared, can be made of great use to students of all capacities if the aid of illustration is sought. The use of lantern, epidiascope, obstetric models, pathological specimens and charts adds much to the interest and value of systematic lectures.

Professor Blair Bell has developed this method of instruction. His department has at its disposal one thousand five hundred lantern slides and he not seldom enjoys the unusual pleasure of receiving a round of applause at the conclusion of a lecture. He has so organized his lectures that each is set out on a card, with headings and subheadings and the numbers of the requisite lantern slides, so that in his absence an assistant can carry on without any interruption of the sequence.

Practical Obstetrics.

Twenty cases of delivery is the minimum requirement both of statute and of common sense. If students were able personally to participate in twenty they would obtain a fair grounding in the work, but unfortunately this is seldom possible. Many attendances consist merely in standing by as onlookers, as the time at disposal is seldom sufficient to allow every student to complete the score. Today the competition of the pupil maternity nurse reduces still more the material available for students. The pupil nurse is compelled before certification to assist personally at deliveries, whereas the student can get "signed up" for attendance at deliveries in the actual conduct of which he takes no part. This is anomalous, tending to the qualifying of nurses better trained than the practitioner from whom they will later receive instructions.

The mathematical adjustment depends upon two inconstants, the number of students and the available material. Given thirty maternity beds, the numbers of deliveries should be about seven hundred and fifty *per annum*, allowing fourteen days as the average puerperium. Assuming fifteen students in each of the fifth and sixth years of the course, they will require six hundred cases in the two years. The pupil nurses will need about the same number, so that the total of one thousand five hundred deliveries should be sufficient for the requirements of both students and nurses with a margin also for interrupted time and vacations.

Thirty students in teams of four, devoting three months to practical obstetrics, would be in residence at the maternity hospital for twenty-two months, thus making use of practically the whole of the fifth and sixth years, but allowing a sufficient interval for examination purposes.

Each team of four in its three months would have available one hundred and ninety cases of delivery, eighty for the students and a like number for their nursing colleagues. It is thus mathematically pos-

sible to insure each student participating in twenty deliveries. The objection is that during term time their obstetric work would be interrupted by attendance at lectures. These, however, need only occupy three hours a day or one-eighth of the twenty-four during which delivery may occur. It does not seem possible to release students from the obligation of regular attendance at lectures, but, if the suggested period of three months can be freed from other clinical duties, the time so made available for practical obstetrics would not be seriously curtailed by such attendance.

The alternative of devoting vacations to maternity work does not appear to be so satisfactory. During the final two years there are eight months of vacation, so that thirty students working in teams of four would only have at their disposal one month for each team. During that month there would be an average of sixty-two deliveries, so that each student would be unable to attend twenty cases. The development of external maternity work may add to the available material and remove some of the difficulties which now beset the smaller medical schools, both of Australia and Europe. The first four cases attended by a student should be under the supervision of a tutor and not merely in the presence of a matron or house surgeon. This essential safeguard offers an excellent opportunity for instruction.

The practical work should not merely familiarize the student with the actual birth of a child, but should be used to teach him:

(i) The fullest aseptic technique.

(ii) The value of abdominal examination before and after the onset of labour, the estimation of descent and rotation by suprapubic palpation of the fœtal head, trunk and limbs and the detection of abnormal presentations.

(iii) The signification of changes in the fœtal heart beat.

(iv) The signs of maternal distress.

(v) The indications for substituting rectal for vaginal examination.

(vi) The proper method of conducting a vaginal examination. Some schools endeavour to eliminate vaginal examination and, indeed, this is very often possible, but the education of the student cannot be considered complete unless he is taught to examine vaginally and to estimate the information so obtained.

(vii) The methods of avoiding or minimizing perineal damage.

(viii) The delivery of the child through the vulva and the section of the cord.

(ix) Examination of vaginal wall and perineum and the repair of these when necessary.

(x) The management of the third stage of labour, that most important period during which haste and impatience are so often displayed.

(xi) The weighing and measuring of the child.

(xii) The management of neonatal infant or *post partum* maternal distress.

(xiii) The maternal and infantile toilets.

Abnormal labour is conducted by members of the resident or honorary staff who should use such cases to teach the management of difficulties and the application of forceps. The student in attendance must be made responsible for the future observation of the patient; detailed notes of condition on admission, the conduct of labour and of the puerperium must be carefully made for the criticism of professor or tutor. The convalescence and the progress of involution must be watched by and explained to him. Whenever possible the same student should be responsible for a patient throughout her antenatal, natal and postnatal career.

Tutorial Classes.

Apart from instruction during labour, it is important that the student receive thorough instruction in antenatal and postnatal clinics. It is a tedious repetition to emphasize again the value of antenatal examination. It is obvious that almost 100% of obstetric difficulties can be foreseen, many prevented, and all adequately provided for. The medical profession must make a response to the universal anxiety concerning maternal mortality and the development of antenatal work constitutes a branch of preventive obstetrics that will unquestionably be productive of a great reduction in the cases of complicated labour that yield most of the fatalities.

It is laborious work, needing enthusiasm, to carry out one hundred examinations in order to winnow the 4% of abnormalities, but repayment is generous both to the public welfare and the practitioner who can thereby eliminate many of the most anxious and exhausting moments of his obstetric work.

Students should attend not less than ten antenatal clinics. After instruction and training they may conduct the examination, estimate pelvic measurements, time of delivery, presentation position and lie, locate the fœtal heart, investigate the mother's general and obstetric history and examine her present state of health. The result of such examination must then be submitted to the tutor for his observation, correction and advice.

Five attendances at postnatal clinics are desirable that instruction may be given in the detection and treatment of maternal morbidity. Throughout their whole time in residence tutorial classes covering the whole range of obstetrics, with special emphasis upon normal delivery demonstrated by means of dummy and fœtus, skeletal pelvis and charts, should be given to students. In number they should not be less than that of the systematic lectures, that is, thirty. These tutorials should be carefully arranged so that sequence is obtained and discursiveness or disjointed teaching avoided.

Pædiatrics.

A course of six lectures by a pædiatric physician is a useful addition to the obstetric course. It is

the most appropriate time to acquaint students with the management of infant feeding, infant derangements and neonatal difficulties, all of which will confront him in the early days of practice.

Research.

Obstetrics bristles with unexplained pathology: the problem of toxæmia, the origin and prevention of sepsis, antenatal and neonatal fœtal death, abortion are but a few examples. Continued, sustained and renewed research is urgently needed. It should be incumbent upon all members of the staff of a maternity hospital that they contribute something to original research. Such individual efforts should as far as possible be part of a collective inquiry so that when the integers are added there is greater chance of substantial gain.

The establishment of a research scholarship would allow of keen and interested young graduates devoting their whole time to research work. This has already been mentioned and need not be dismissed as impracticable, for the amount of money needed is not great. Such a scholarship has already been created under the control of Sir Ewen Maclean by so small a school as the University of Wales.

Staff Meetings.

Regular meetings of the staff are desirable to foster the team spirit, to discuss problems, to seek new fields of activity and new methods of practice and teaching.

Case Records.

Of all methods of case recording that the writer investigated in European hospitals, the most satisfactory was that in use at the City of London Lying-in Hospital. The case sheet of four pages provided for a full antenatal history on the front; within was a temperature chart, labour and puerperal record, whilst on the back page provision was made for a postnatal examination. The sheet was protected from damage while in use by a stiff cover and was eventually filed under a key number. Two small card index systems were added to afford an alphabetical record and an index of various complications.

The patient's whole history was contained in the one document. Upon admission for delivery her antenatal history was immediately available and at any postnatal visit her story could be brought to a satisfactory completion. For reference, either name or number was sufficient to obtain easily a full, self-contained record of her pregnancy and confinement. The value of such a record is obvious; the compilation of it by the student is an education and the preservation of it affords excellent material for statistical research.

The value of carefully kept records can be augmented by the services of an almoner, an office often undertaken in an honorary capacity by a charitably minded lady who keeps in touch with patients and assists in any "follow-up" policy that may be required by the staff.

Liaison.

From the point of view of public welfare an obstetric unit does not stand alone, but is a component in schemes of increasing importance for the supervision of maternal and infant welfare. The value and usefulness of maternity work are greatly enhanced if it is linked up with every agency concerned with mothercraft and infant life such as schools for mothers, infant welfare centres, visiting nurses, sanitary inspectors, domestic helpers, charitable organizations, independent antenatal clinics, convalescent homes, State children's departments and the Salvation Army.

The executive head of an obstetric unit should endeavour to engage all such agencies in the task of protecting motherhood and infancy. As far as possible he should act in an advisory capacity to committees controlling such work and establish a complete and harmonious liaison between them.

This is a very incomplete scheme, for an obstetric unit. Details depend on local conditions, financial stumbling blocks are frequent and vested interests may hinder, but it is intended to emphasize again the fact that obstetrics is a much wider and more comprehensive study than is generally supposed. It impinges upon every branch of medicine, it concerns almost every epoch of a woman's life and upon its success depends the happiness of many families and homes.

Gynæcology has not been considered, but it is not intended that there should be any divorcement of this closely related subject. It has been omitted to avoid confusion and to leave the plea for improved obstetrics untrammelled by extraneous considerations. For the Utopianism of this paper the excuse is again found in Lord Moynihan's words: "Ideals are for pursuit, not for attainment."

RECENT WORK ON STAPHYLOCOCCAL TOXINS, WITH SPECIAL REFERENCE TO THE INTERPRETATION OF THE BUNDABERG FATALITIES.[1,2]

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AND

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(From the Walter and Eliza Hall Institute, Melbourne.)

DURING the past two or three years a series of investigations on the toxic substances produced by the staphylococcus has been carried on in this institute. Interest in the question was provoked in the first place by the result of the investigations carried out by the Royal Commission appointed to inquire into the cause of the fatalities at Bundaberg in January, 1928. The Commission found that death was due to acute toxæmia following the injection of large amounts of a living culture of *Staphylococcus aureus*.

[1] The researches described here were carried out under a grant from the Department of Health, Commonwealth Government.

[2] Read at a meeting of the Victorian Branch of the British Medical Association on June 4, 1930.

The general facts of the occurrence are probably well known to you, but it may be convenient to give a brief *résumé* of those facts that bear on the question of the actual causation of the symptoms shown by the affected children. You will recall that the deaths followed inoculation with toxin-antitoxin mixture given as a prophylactic against diphtheria. All the children were inoculated from the one rubber-capped bottle which contained no antiseptic and from which a heavy culture of staphylococci (pale *aureus*) was subsequently grown. Of twenty-one children inoculated on the occasion in question, three showed no symptoms beyond the subsequent appearance of an abscess at the site of injection. The other eighteen showed severe symptoms, commencing in most cases about five or six hours after the inoculations, and twelve died, ten within twenty-four hours after inoculation and the other two a few hours later. The symptoms in all these cases were more or less similar, an onset with vomiting and diarrhœa, followed rapidly by collapse and cyanosis. The temperature was raised in all the cases examined and in some there were rigors or convulsions.

Post mortem examination revealed no gross abnormalities and the only distinctive findings on histological examination of the tissues were toxic changes in the lymph glands—engorgement, cellular disintegration and phagocytosis of the disintegrating material by reticulo-endothelial cells.

All the children who recovered, showed an abscess at the site of injection from which a staphylococcal culture was obtained in all the cases examined.

It was obvious that death was due to the introduction or development within the body in large amount of some acutely acting toxic agent and the investigation resolved itself into a consideration of the possible nature and source of this agent. The following possibilities were considered: (i) An excess of diphtheria toxin in the mixture either from technical error in its preparation or from dissociation of the toxin-antitoxin union subsequently, by such means as freezing, the action of acids or of bacterial contaminants. These possibilities were all negatived on adequate evidence which need not be given in detail. (ii) Anaphylactic death. (iii) Bacterial or toxic food poisoning. (iv) Tetanus. (v) Some unknown acute infectious disease unrelated to the inoculation. Very brief consideration was sufficient to dismiss these latter possibilities.

The only positive facts that emerged from the pathological investigations pointed to the implication of staphylococci. (i) The fatal bottle contained a heavy growth of staphylococci and the evidence was almost complete that these organisms were present in large numbers when the inoculations were made. (ii) The staphylococcus isolated from the local abscesses in the children who recovered, was proved to be identical in each case with the organism obtained from the bottle.

The children were certainly inoculated with a living culture of a pyogenic staphylococcus and from the exclusion of any other possible cause of toxæmia, the Commission concluded that the staphylococci were actually responsible for the overwhelming toxæmia and rapid death.

No serious criticism of this conclusion has been made, but it came as a surprise to bacteriologists and clinicians that staphylococci could provoke so fulminating an illness on subcutaneous injection. The illness did not resemble the ordinary clinical forms of staphylococcal septicæmia, but was an acute intoxication which either ended fatally or was overcome within a day or two in the cases that recovered. Further, as judged by animal experiments, the strain isolated was by no means that of an exceptionally virulent staphylococcus. Unless we can substantiate the presumed power of staphylococci to produce a rapidly acting toxin, there must still be a lurking doubt that some completely unknown second factor was really responsible for the Bundaberg deaths. It is one of the chief aims of this paper to show that such a toxin can be obtained from any of the pyogenic staphylococci and to discuss briefly the various experimental manifestations of its activity and the circumstances under which it is produced.

Although there is a conspicuous absence of any reference to staphylococcal toxins in the ordinary text books of bacteriology, it must not be supposed that no previous work had been done on the question. Without going into a historical survey, it may be stated that practically all the aspects of the toxin that will be discussed have been previously studied, but in our work here we have been able to use stronger toxins than are described elsewhere in the literature and by their use have probably been able to reach a more satisfying general picture of the toxic activities of the staphylococcus than has appeared elsewhere. In the description of the various manifestations of the toxin therefore, although our own experimental data are utilized, much of the work is a recapitulation of that of Neisser and Wechsberg, Kraus, Nicolle and Cesari, Russ and Parker, to mention only the most important names.

The Activities of the Toxin.

The conditions under which staphylococci produce toxin most readily are of particular interest, but are most conveniently discussed in a later section after the various manifestations of toxic activity of culture filtrates have been described.

A true toxin may be defined as a dissolved inanimate substance, capable of damaging living cells, which, when suitably injected into an animal, provokes the appearance in the serum of an agent capable of neutralizing specifically the destructive effect of the toxin. Now there are at least five ways in which staphylococcal filtrates can be shown to damage living cells or tissues and in each case this damage can be prevented by a suitable antiserum. It is doubtful if staphylococcal filtrates possess any noteworthy biological activities that cannot be neutralized by antisera. All the charac-

teristic effects are therefore due to a true exotoxin or mixture of exotoxins and we may now describe these various effects.

The first toxic action of staphylococcal filtrates to be described was their destructive effect on the blood cells, both leucocytes and red corpuscles. Under the influence of the toxin—so-called leucocidin—the leucocytes could be seen to lose their amœboid character and showed various disintegrative changes when stained. If the toxin were mixed with a suitable amount of a serum from a rabbit immunized by injection of similar filtrates, the leucocidin effect did not appear.

The action on the red blood corpuscles is shown by hæmolysis tests and can therefore be very easily studied along quantitative lines. The hæmolytic titre of a given filtrate is determined by making a series of successive dilutions of the toxin in saline solution, adding a definite amount of washed red blood cells to each tube and allowing an hour in the incubator at 37° C. for the hæmolysis to develop. The titre may be expressed either as corresponding to the dilution of the last tube to show complete hæmolysis or more conveniently 50% hæmolysis may be taken as the end point. All the determinations of hæmolysin titre described in this paper were made with rabbit corpuscles and the figure given represents the final dilution of toxin in the tube, showing 50% hæmolysis after one hour at 37° C.. Staphylococcal hæmolysin is probably the most powerful of all the bacterial hæmolysins, some filtrates showing a titre as high as 1:10,000.

When strong toxins are injected intradermally into the depilated skin of the rabbit, very severe necrotic lesions result within twenty-four hours. A yellowish central area of necrosis appears which spreads in the direction of the lymph flow, giving a band a centimetre or two wide which often passes down to the mid-line of the belly. Bordering the necrotic area is an erythematous zone. If successive dilutions of toxin are used, the areas of necrosis become smaller and the higher dilutions give erythematous lesions only. When this method is used to titrate the activity of the toxin, the end point we have used is the dilution giving in a dose of 0·1 cubic centimetre a definite erythematous lesion at least one centimetre in diameter.

The toxin has a characteristic effect on the human skin, producing reactions of the Schick type in high dilution. The reaction varies greatly in different individuals. In susceptible persons the intradermal injection of an amount corresponding to about one-fifth of a minimal hæmolytic dose gives a central area of brownish erythema surrounded by a wider pink flush, often fairly sharp-edged. The reaction appears about twelve hours after injection and is at its maximum about twenty-four hours. Occasionally there is slight tenderness and swelling.

Finally we come to the most striking action of the toxin, its acute killing power when given by intravenous injection. The rabbit is killed by a smaller dose than any other laboratory animal and rabbits were used in most of our experiments. Cats, guinea-pigs and mice, however, also show the same acute killing. When the effect is tested in the rabbit, the animal usually remains quiet and hunched up for about a minute after the intravenous injection. Then it begins to move about unsteadily, falls over and shows rapid, shallow breathing. Convulsions soon follow and the corneal reflex is rapidly lost, the animal dying usually in about three minutes. *Post mortem* the only characteristic condition found is in the heart. The right side of the heart is greatly distended with blood, the left almost empty.

It is generally considered that one of the most characteristic attributes of true toxins is their latent period. No matter how many thousand lethal doses of diphtheria toxin one administers to a guinea-pig, one can never reduce the survival time below some hours. But here we have a bacterial product which, given in a moderately large dose, may kill within two minutes of injection. It can be shown at once that the effect is due to a true exotoxin, since it is completely neutralizable by antiserum. Protection by antiserum against this toxin is one of the very few immunological experiments that can be used as a lecture demonstration. As the experiment is a rather striking one and can be completed within five minutes, I should like to demonstrate it before going further.

If the dose is made smaller so that death is delayed for twelve to forty-eight hours, the most striking lesions found *post mortem* are those in the kidney. There are almost regularly widespread necrotic lesions scattered over the cortex and extending down into the kidney substance to a depth of about a millimetre. The boundaries of these necrotic areas are sharply demarcated as a rule from the surrounding kidney tissue by a zone of engorgement and cellular activity. The use of the staphylococcal toxin for the production of experimental kidney lesions does not seem to have been previously described and may offer a useful weapon for the investigation of some questions of renal pathology.

The effect of intravenous injection in the cat is not quite so dramatic as in the rabbit, but there is the same acute killing by large doses and with a certain intermediate dosage the symptoms present a most interesting parallel to those of the Bundaberg children. When kittens a little over a kilogram in weight were given 0·06 to 0·08 cubic centimetre of a strong toxin intravenously, they died in from two and a half to four and a half hours. The earliest symptom was dyspnœa which appeared in from three to five minutes after the injection. Vomiting also occurred early and diarrhœa with mucus was frequent within the first half hour. During this early period there were ataxia, general weakness and often incoordinate movements of the head and limbs. At this time the pupils were contracted. The next stage was that of collapse with occasional convulsive movements and increasing general weakness. Finally respiratory failure occurred with absent corneal reflex and widely dilated pupils.

Post mortem the animals receiving this dosage showed very uniform and rather striking lesions. There were frequently small hæmorrhages in the lungs. Pericardial effusion, occasionally blood-stained, was almost constant and the heart sometimes commenced to beat again when the pressure was relieved by opening the pericardium. The right side of the heart was dilated and there were numerous hæmorrhages in the heart muscle. The most striking feature was extensive hæmorrhage in the posterior mediastinum, spreading under the visceral pleura along the borders of the lungs and from the hilum around the bronchi into the lung substance. Intravascular hæmolysis was also a prominent feature in these animals.

As has been mentioned earlier, all the various activities of the toxin that we have described, can be neutralized by an appropriate amount of an antitoxic serum. The question therefore at once arises as to whether all the manifestations may not be due to a single antigenic substance. This question is of importance in any attempt to transfer the results of animal experiment into the clinical field, because if it can be shown that all the effects on rabbit cells and tissues are due to a single antigen, then it is extremely probable that the toxic actions of the staphylococcus that are shown in man are due to the same entity. If, on the other hand, we are dealing with a mixture of several distinct antigenic entities, hæmolysin, leucocidin, skin toxin, nephrotoxin and so on, we must consider it very possible that there are still other antigenic substances responsible for the clinical phenomena in man.

We shall endeavour to show that there is almost complete evidence in favour of the unity of the staphylococcal toxins. We may first recapitulate the characteristics of a true bacterial exotoxin as distinguished particularly from endotoxins and poisonous products of proteolysis *et cetera*. A true exotoxin is produced by actively growing bacteria, not by autolysis of the bacterial bodies. It stimulates the production of an antitoxin which neutralizes all its destructive activities according to the law of multiple proportions, that is, when the conditions of the experiment are kept constant, if X cubic centimetres of serum neutralize Y cubic centimetres of toxin, then 10X cubic centimetres of serum will neutralize 10Y cubic centimetres of toxin. Finally, a true exotoxin can be detoxicated by treatment with formalin while still retaining its immunizing properties; a toxoid or anatoxin is produced. In the course of our work all these characteristics have been established for the three most important activities of the toxic filtrates, the hæmolytic, the skin necrosing and the acute killing effects.

We are therefore dealing with one or more true exotoxins. The unity or plurality of the toxins can be decided only by comparing the activities of a number of toxic filtrates and antitoxic sera. In the first place we have found that although different batches of filtrate may have widely differing activities, yet when titrated by the three methods described, the relation between the doses necessary to give the "end point" reaction is very nearly constant for all filtrates. If the minimal hæmolytic dose is taken as the unit, about 1·5 minimal hæmolytic doses are needed to give a minimal skin reaction and it takes about three hundred minimal hæmolytic doses per kilogram to kill a rabbit within five minutes. This constant relation has been the rule in our work, but it is not invariable. When a filtrate is treated with formalin, the hæmolytic power is very considerably less impaired than the other two functions and the same predominance of hæmolytic activity is sometimes found in untreated filtrates. This cannot be considered an argument against the unity of the agents concerned, as it probably signifies only that the so-called "toxophore group" in the course of its modification by formalin or other agency retains its power to injure red blood cells after its other capacities are lost.

A more important criterion of unity is derived from the behaviour of antitoxic sera obtained by different procedures. Since toxin and toxoid are antigenically identical, producing a single antibody, all antitoxic sera should show a constant relationship between their capacities for neutralizing the various actions of the toxin. This is found to be the case. In Table I the properties of sera from three rabbits immunized by two different toxins and in the third case by subcutaneous injection of living staphylococci are shown.

TABLE I.

Method of Immunization.	Antitoxic Titres.		
	General.	Skin.	Red Blood Cells.
Toxin "Wood" intradermally	15	160	2,560
Living culture "Wood" subcutaneously	1	10	120
Toxin "Bundaberg" intradermally ..	2	20	320

The sera differ greatly in potency, but the table shows that in these three cases at least a serum that is, for example, ten times as effective in neutralizing the killing effect of a toxin as another serum, is also ten times as effective as an antihæmolysin or in neutralizing the skin effect. This constant relation is characterstic of all the sera we have tested. The strain of staphylococcus used does not seem to influence the results. Different strains vary greatly in the amount of toxin produced, but the antigenic qualities of the toxin are always the same. We thus reach the conclusion that the pyogenic staphylococci produce a typical exotoxin, antigenically a single substance, which is responsible for a wide range of destructive effects on mammalian cells and tissues. This toxin, as far as can be judged from the literature and from our own work, is produced by all the pyogenic staphylococci and is in all cases qualitatively (that is, antigenically) identical, although produced in extremely variable amount by different strains.

We may now very briefly mention the conditions under which the toxin is most actively produced. The first essential, if a highly active toxin is to be produced, is to choose a suitable strain of staphylococcus, a good preliminary guide being the degree of hæmolysis shown by the colonies on a blood agar plate. Colonies surrounded by a wide halo of hæmolysis will usually prove satisfactory toxin-producers. The toxin is produced both in broth or on agar. Being readily diffusible, it passes into the mass of the agar in the latter case. If we compare the mass of staphylococcal growth given by similar volumes of broth and of nutrient agar suitably disposed, the agar growth will be found much more abundant and there is a correspondingly greater amount of toxin produced. Our best toxins have been prepared by growing the strain on plates of the weakest agar that can be conveniently used (about 0·8%) for two days and then squeezing out the liquid by allowing the chopped-up agar to drain through a funnel packed with glass wool. This liquid is then centrifuged and the supernatant liquid passed through a Seitz filter to get rid of the staphylococci.

Greatly increased production of toxin is induced if the cultures are grown in an atmosphere containing 10% to 20% carbon dioxide. For this purpose McIntosh-Fildes anaerobic jars filled with suitable air-carbon dioxide mixtures have been used as containers for the plates during incubation. We have been able to show that for toxin to be produced in any amount the intracellular pH of the staphylococci must be kept on the acid side of neutrality (pH 6-7) and the function of the carbon dioxide is to maintain this intracellular acidity. A further point of some general interest is that most of the common pyogenic *aureus* staphylococci on occasion give rise to non-pigmented *albus* variants which appear to have an enhanced ability to produce toxin *in vitro*. They do not need the added carbon dioxide if the medium is kept slightly acid. The influence of environmental factors (particularly hydrogen ion concentration and carbon dioxide tension) and of variant formation on the production of toxin, provides one of the most interesting aspects of staphylococcal biology and may have some bearing on pathology. One need only mention that the moderate carbon dioxide tension in normal tissues is greatly increased whenever the local blood supply becomes inadequate for any reason, such as injury or infection.

Pharmacological Actions of Toxin.

The acute killing effect of the toxin is the most dramatic and for a bacterial toxin most unexpected aspect of its activity. We have therefore recently carried out a pharmacological analysis of its action, using both cats and rabbits. The effects are essentially similar in both species and as it is the more convenient animal for experiment, most of the work was done on cats.

It could be readily shown that the immediate cause of the acute killing by intravenous injection of toxin was a rapid circulatory failure. Blood pressure tracings in the intact animal show first a slight fall, a subsequent rise to or above the normal level and then from thirty to sixty seconds later a rapid, progressive fall almost to zero. Suitable experiments showed that the central nervous system played no part in the reaction. The typical effect could be obtained even in a preparation in which the whole of the central nervous system had been destroyed. Vaso-motor reactions were shown by plethysmograph experiments to be slight and of no significance in regard to the major aspect of the phenomenon, the rapid terminal fall of blood pressure. The site of action of the toxin was thus limited to the heart and lungs and further experiments were directed toward elucidating the part played by each of these.

A good deal of information could be obtained by simple observation of the intrathoracic organs in an anæsthetized animal in which the thorax had been widely opened. Artificial ventilation by pump and tracheal cannula is, of course, necessary. After injection of the toxin, the first change to occur is a diminution in the extent of movement of the lungs. About a minute after the injection and just after the change in lung movement, the right heart appears to become overfilled, the left auricle being empty and the right auricle and ventricle and the pulmonary artery distended. The heart is meanwhile contracting strongly and slowly, but ineffectively, and after two or three minutes, during which the beats become progressively feebler, the ventricles cease to contract and the circulation ceases.

The effect of toxin on heart-lung preparations and on isolated heart and isolated lung preparations was now studied. In the heart-lung preparation of Knowlton and Starling the general circulation is replaced by an artificial one in which the flow can be measured and the resistance adjusted to any desired level. In these experiments the pressures in the aorta and pulmonary artery were recorded as well as the rate of flow through the artificial circulation. Injection of toxin into this system gave three characteristic effects: (i) The extent of the excursion of the lungs under artificial ventilation was diminished and as a general rule pulmonary œdema soon appeared; (ii) there was a rise in the pulmonary blood pressure; and (iii) there was a fall in the systemic blood pressure and a great decrease in the rate of blood flow which soon ceased altogether.

This type of experiment demonstrates that one important factor is an increase in the resistance to circulation through the lung. One can demonstrate this increased resistance, uncomplicated by any action on the heart, by using a pump to supply a constant blood circulation through the isolated lungs. After injection of toxin into the system there is a rapid rise in the pulmonary pressure and a great diminution in the outflow from the pulmonary vein. The increased resistance is probably due to contraction of the pulmonary arterioles. In itself this might be sufficient to render the circula-

tion inadequate to maintain the life of the animal, but from experiments on the isolated heart, using a technique specially devised by one of us (C. H. Kellaway), it could be shown that there was also a directly weakening action on the heart. A preparation was made in which both systemic and pulmonary circulations were artificial, a "lung" of glass beads over which oxygen was passed being included in the system. The arterial and pulmonary pressures were recorded and the rate at which blood was delivered from each side of the heart was measured. With this preparation it was shown that the introduction of strong toxin into the system was followed in five to six minutes by a rapid diminution in the heart's output and fall in arterial pressure, followed in a few minutes by complete stoppage of the heart. When an amount of antiserum sufficient to neutralize an effective dose of toxin was first introduced into the system, injection of toxin was without effect on the preparation, showing that the weakening effect was actually due to the toxin.

We can now give a fairly complete picture of the process that follows intravenous injection of toxin into a sensitive animal. The toxin passes at once to the right side of the heart and into the lung vessels before being diluted with the bulk of the blood and tissue fluids. Thus it comes to act in relatively high concentration on the sensitive lung circulation, causing, like many non-specific poisons, a tonic contraction of the arterioles. The increased resistance increases the work of the right ventricle and diminishes the volume of blood passing to the left side of the heart. At the same time there is a directly toxic action on the heart itself, weakening its mechanical efficiency as a pump and so further diminishing the rate of the circulation. There is a block in the circulation through the lung and a diminished ability of the heart to overcome the block. The result is a rapidly developing failure to maintain an adequate circulation and death.

The acute killing by intravenous injection is rather an artificial manifestation of the toxin's activities. It is probable that almost every functioning cell in the body is more or less severely damaged by the staphylococcal toxin and the form the symptoms take after its introduction, will depend on the more or less fortuitous circumstances which determine where the greatest concentration of toxin in contact with sensitive cells will occur. An intradermal injection results in necrosis of the tissues at the point of injection and along the line of lymph drainage from the region. Probably most of the toxin is fixed by the affected tissues and no obvious general symptoms appear. A large intravenous injection, as we have seen, reaches the pulmonary arterioles in high concentration and there causes a fatal obstruction to the circulation. If the intravenous injection is smaller, the primary effect on heart and lungs is small enough to be successfully resisted, the toxin is rapidly diluted in the blood stream. Its excretion by way of the kidney involves an increased local concentration in this organ with consequent necrotic lesions such as we have described.

In the concluding section of this paper we may mention a few facts bearing on the significance of the staphylococcal toxin in experimental staphylococcal infections and perhaps offer some suggestions as to its significance in human infections with the organism.

In the first place one can show that toxin is actually produced *in vivo* in staphylococcal infections: (i) by the appearance of the specific antitoxin in the blood following subcutaneous inoculation of living staphylococci and the formation of a local abscess and (ii) by direct titration (for toxin) of exudates (particularly pericardial fluid) or serum from rabbits just dead from staphylococcal septicæmia.

But the influence of active or passive antitoxic immunity on the course of the highly artificial disease produced by injecting staphylococci intravenously in rabbits is comparatively slight. Using the strain "Wood," 0·5 cubic centimetre of a young broth culture given intravenously invariably caused the death of normal rabbits within twenty-four hours. Of three rabbits actively immunized against toxin and containing abundant circulating antitoxin, which were given this dose, one died in twenty-seven hours and two died on the sixth day after injection, showing multiple kidney abscesses as the most prominent *post mortem* lesion. The serum of the rabbit dying in twenty-seven hours was obtained immediately after death and on titration still showed quite a high antitoxic titre. While death may conceivably have been due to local liberation of toxin by staphylococci growing within certain vital tissues, it was certainly not due to toxæmia in the ordinary sense of the word. Free toxin cannot exist in the presence of excess antitoxin.

In another experiment a number of normal rabbits were given varying amounts of antitoxic serum intravenously and immediately afterwards a standard dose of staphylococcal culture. The control rabbits all died during the night following the injection, while for the most part those receiving serum survived till the next night, but only one lived more than forty-eight hours.

These experiments, of course, do not either prove or disprove that the toxin is the actual killing agent involved in these infections. All they can show is that the organisms can gain a foothold and multiply in the body, even if all the toxin they produce is immediately neutralized. Diphtheria and tetanus bacilli can only multiply if by the necrotic action of their toxins they can form a local nidus exempt from the ordinary antibacterial activities of the body. The presence of a purely antitoxic immunity will therefore protect against infection. A virulent staphylococcus, however, seems capable of multiplying in normal unnecrosed tissue.

The part played by the toxin in human staphylococcal infections remains to be evaluated. All we wish to suggest in this regard is that the recognition

of the distinctive character of the staphylococcal toxin may furnish a weapon for the elucidation of some of the problems of staphylococcal infections in man. It seems almost certain that the typically necrotic character of the boil and carbuncle or of the osteomyelitic lesion is due to the activity of the toxin we have been considering. As a provisional hypothesis one might suggest that the great individual variations in susceptibility to skin infections by the staphylococcus are related to varying ability to produce staphylococcal antitoxin. Methods of investigating this hypothesis by skin test and by titration of the antihæmolysin content of the blood serum are available and in the staphylococcal toxoid there is a potential agent for producing antitoxic immunity with a minimum of inconvenience to the patient.

One must be rather dubious as to the therapeutic potentialities of an antistaphylotoxic serum in acute general infections by the organism. It might possibly do good in acutely toxic conditions such as osteomyelitis in children, but where there is definite septicæmia, the evidence from animal experiments is quite discouraging for the reasons we have mentioned.

In concluding, we would again emphasize that very little of the work described is essentially new. Nearly all the fields have been touched on by others and we have only elaborated their findings into a more coherent body of facts. There can, we think, be no doubt that in the staphylococcal toxin we have to deal with as definite an entity as diphtheria or tetanus toxin. The pathology of staphylococcal infection is more complicated than in the case of diphtheria and tetanus, but, even so, the local production of toxin must be considered as one of the main features determining the form taken by staphylococcal lesions. The part played by the toxin in generalized infections remains to be investigated, but the Bundaberg tragedy shows that under certain conditions large amounts of staphylococcal toxin can be elaborated in the human body, causing death in a manner that closely paralleled the phenomena we have described in laboratory animals.

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PAINFUL SHOULDER.

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FROM time to time the physician and the surgeon will be consulted by a patient whose chief symptom is pain in the region of the subdeltoid bursa. He may say that the pain came on suddenly and gave him in a short time acute suffering, while others will say that the onset was gradual, the ache became chronic and that they have suffered more or less for months, and in some cases for years. Thus Lilienthal, the famous American surgeon, says that he has suffered from "painful shoulder" for thirteen years.

Now these cases have been familiar to us for years, but it is only recently that it has begun to dawn on us that they are not instances of cervical neuralgia, nor of cervical neuritis, nor yet of rheumatism, arthritis or sinovitis, but rather a myalgia. The X rays have helped to clear up the mystery and we may now have an explanation of this painful condition.

Nomenclature.

I think "painful shoulder" is a better title for the subject that I am about to deal with than subacromial bursitis—the other term frequently applied to this affection—because "painful shoulder" does not tie us down to a diagnosis that proclaims this complaint a bursitis.

Many of us have seen cases in which the subdeltoid bursa has become enlarged because its fluid contents increased considerably; recently I drew off nearly two ounces of fluid from a patient who was being treated by a physician for supposed arthritis with effusion of the shoulder joint. The bursa filled again and was aspirated a second time and then all pain disappeared. But the condition that I want to draw attention to, does not appear to arise primarily in the bursa, although the bursa may possibly be affected in some few cases. Investigation made by reliable observers such as Berton Carnett, Eugene Case, Francis Haussling and Moschowitz have led to the belief that the seat of origin of the trouble lies beneath, but is posterior to the subdeltoid bursa and is situated in the tendon of the supraspinatus muscle.

Ætiology.

The present verdict is that the ætiology is undetermined. There is an inclination to attribute this condition to injury of the supraspinatus tendon inserted in the greater tuberosity of the humerus. Carnett who has had experience of operations on some fifty cases of this condition, does not think that it is due to external trauma, as from a blow; but others still cling to this idea, while some consider that the trouble is started by a fall while the arm is in an abducted position, the head of the humerus being sent upwards and a pinching of the tendon of the supraspinatus taking place between the greater tuberosity and the coraco-acromial ligament.

I have seen two medical men with the complaint recently. One said that he thought his condition had been caused by strain while adjusting his X ray apparatus. The other who has a well-defined calcareous nodule in the supraspinatus tendon, says that he thinks that the pain came on after trying to lift his car.

Some observers think that the cause of this tendon lesion is most often due to occupational trauma and hold that it is seen most frequently in individuals such as typists, pianists, chauffers and others who work with their hands while their elbows are held away from the sides of the chest. In this position the supraspinatus tendon is subject to bruising and pinching trauma between the greater tuberosity and the acromion or the coraco-acromial ligament. That work in this position will make a patient with mild symptoms worse was illustrated in the case of one of the medical men mentioned above who told me that most of his painful symptoms had disappeared, but as he had to do his own typewriting for a week, the pain in his shoulder returned as badly as ever.

Some observers hold the view that the trouble is of bacterial and toxic origin. Wolfe, for instance, considers that the condition is due to infection with the *Streptococcus viridans*, secondary to foci in the teeth or tonsils, while Breckner says that the assumption of a bacterial or toxic origin has not been substantiated.

Symptoms.

As we do not know what the origin of the condition is, I shall next give some of the prominent symptoms.

The subjects are seldom below thirty years of age. The pain sometimes begins very quickly and it may be almost unbearable. In one case that I saw in consultation, the patient was sitting up in bed weeping with the agony of his shoulder; nothing gave him ease except half-grain injections of morphine. In other cases the pain is not so severe, it is more an ache and then gets worse at night, the patient waking up with intense pain so that he cannot rest in bed, but must get out of bed, as one of my patients told me, to raise the arm and rest it high up on some article of furniture. The pain may be only in the deltoid region or it may extend down the whole arm. It has been pointed out by some observers that, while the pain may be very severe in the lower half of the deltoid region, patients seldom complain of the region immediately overlying the bursa. Carnett has drawn attention to the fact that both in acute and chronic conditions of this affection there is almost always a tender area situated immediately beneath the edge of the acromion process and in the region of the greater tuberosity, in that spot where the calcareous deposit is in the tendon of the supraspinatus, and also in those cases where there is no deposit, but where the alteration has taken place in the tendon.

When we examine one of these patients and ask him to abduct his arm, if the pain is very severe, he may be unable to do so, though the arm may be raised by passive motion. If the patient is able to abduct and raise the arm, the pain is increased when the arm is passing through that portion of arc from 75° to 90°. The explanation of this appears to me to be that, if we agree with Francis Campbell that the deltoid is the only abductor of the arm, then the moving out of the arm is first performed by the deltoid in these cases; but when the arm has to be raised, this has to be done by the supraspinatus and the deltoid combined, and when these begin to act together, the arm is at 75° and the tension put on the supraspinatus causes the increased pain. The patient usually nurses the hand of his bad arm with the hand of the good arm. If you ask him to touch his buttock with the hand of the bad arm, the action always increases his pain. The elbow is usually kept close to the chest wall.

In some cases there is a rise in temperature, but this is not the rule; nor does inspection usually show any swelling unless the bursa is inflamed. There is always restricted movement of the shoulder joint and this no doubt tends to some atrophy of the deltoid and probably of the supraspinatus itself.

Histopathology.

Eugene Case has had the opportunity of examining specimens removed by Carnett during the course of his operations. He thinks that the sequence of changes in the tendon seems to be a primary interference with the blood supply, and this is followed by necrosis; in the necrotic tissue are deposited calcium salts. In many instances, but not in all, inflammatory reaction is excited. The nutrition of the tendons being impaired, some hyaline degeneration is present. The calcium salts may be deposited in one mass which is often soft and cheesy, while in other cases there may be many small separate deposits. Attempts at culture show that it is sterile. Chemically examined, the deposits were found to consist of some salt of calcium, the phosphate, oxalate or carbonate.

Diagnosis.

Remember that this condition is not found in subjects below twenty-five or thirty years of age. Ask if the patient uses the typewriter often or if a pianist. I do not know whether tennis players are subject to this complaint, but I should think that as the supraspinatus plays such a prominent part in the elevation of the arm, tennis playing might be a possible explanation for some of the cases of "painful shoulder." Note the attitude of the patient holding the bad arm against his chest with the hand of the good arm to ease it. Notice the disinclination to move the arm out (abduction), while passive forward and backward motions of the arm cause little pain compared to elevation and abduction or placing the hand behind to touch the buttocks.

There are at least twenty pathological conditions that will cause pain in the shoulder, but while many of them cause pain all round the joint, in this condition there are spots, as already pointed out, that appear to be the special areas of pain in "painful shoulder." In every case a skiagram should be taken, and Dr. Oxenham who has had experience in taking skiagrams of this affection both here and in America, tells me that the skiagrams should be taken with the humerus in extreme inward and also extreme outward rotation. For the external rotation view the elbow should be flexed to a right angle and

the hand turned away until its back can rest on a table. The small shadow cast by the calcareous nodule in the tendon of the supraspinatus will at once assure us that we are on the right track; but the absence of the nodule does not prove that the patient is not suffering from "painful shoulder."

We must remember that there are: (i) cases of this affection with symptoms in which the calcareous deposit is in the tendon of the supraspinatus; (ii) cases in which the deposit is not present, but the symptoms are the same; (iii) cases in which the calcareous deposit is present and yet there have never been any painful symptoms; (iv) cases in which the injection treatment cures the painful symptoms, but the calcareous nodules remain and give rise to further symptoms.

I call to mind two cases of pain in the shoulder in which one might be deceived. I was asked by Dr. Lawrence Hughes to operate on a man with abdominal symptoms. The patient had excessive pain in his shoulder in the deltoid region. He had a hæmatoma of the liver and the pain in the shoulder was a phrenic shoulder pain.

In another case a young man was sent to me with pain and a slight fullness under his deltoid. He had fallen out of a cart on to his shoulder and they thought the pain and fullness might indicate an abscess. He had a sarcoma and I had to perform an interscapulo-thoracic amputation.

Both patients were men under twenty; therefore one would not expect "painful shoulder" if we remember that it does not appear usually in subjects below thirty.

Course of the Complaint.

It is said that this condition has a marked tendency to spontaneous recovery. One medical friend whose skiagram shows a large nodule in his supraspinatus and who has suffered very considerably for months from this complaint, tells me now that the pain and inconvenience are very much decreased, but this is not due to any treatment; he refused the injections. In another case which was at first diagnosed by the patient's medical attendant as due to osteoarthritis of the cervical vertebræ, the pain after four months has now decreased very much, since she had two teeth out. On the other hand, the pain may go on for months or for years, as in Lilienthal's case.

Treatment.

Bearing in mind the tendency to spontaneous recovery in this condition should teach us not to recommend operative treatment at once.

Having satisfied oneself that one is dealing with a case of "painful shoulder," the first thing to do after examining the skiagrams is to advise rest. Now, merely ordering patients to bed is not sufficient, for at night time they always are awakened by the pain in the shoulder. The object to be achieved is to fix the arm in an abducted and elevated position, and it must be kept in that position by a plaster of Paris spica, somewhat similar to that in use in fracture of the neck of the scapula. Jones and Lovett agree that the arm should be fixed in a position of abduction, but suggest that there should be slight external rotation, for if this is not done, adaptive muscular shortening and perhaps articular adhesions may cause stiffness.

If we reject the plaster, a splint can be fixed to a metal upright which runs up to the posterior border of the axilla and down to a corset-like belt which is supported by straps running over the sound shoulders. (Such an apparatus can be seen in Page and Bristow's "Treatment of Fractures," Third Edition, page 92, figure 44.)

Splint treatment has this advantage, that while it is being tried, diathermy and massage and injections may also be tried. Wolfe, however, says: "In treatment too much emphasis cannot be placed upon a fact that heat in any form is contraindicated." Others do not agree with him.

Gentle massage gives good results and Lilienthal declares that he was cured by massage.

If the patient does not improve, the next step is to try deep injections. Haussling who has cured many cases of "painful shoulder" with injections, gives the following directions.

At the point of greatest tenderness an injection of two mils (thirty minims) of a 4% solution of quinine and urea hydrochloride is given into the muscle, a five centimetre (two inch) 33 gauge needle being plunged to the bone and then withdrawn 18 to 12 millimetres (three-quarters to half an inch). This is repeated every twenty-four hours until the pain is definitely relieved. The injection is made slowly into the muscle, not the subcutaneous tissue. Haussling points out that 1% or 2% solutions are not efficient. I have known the ordinary solution that is used for local anæsthesia to be used; but it fails, as it is only 0·5% solution. Messrs. Elliott Brothers tell me that they have up to 5% solutions. Haussling says that he has given many injections, but he has never seen an abscess form. Needless to say that the skin should be prepared for twenty-four hours before the needle is used.

If the injections fail, then the following operation, carried out in many cases by Carnett, may be tried.

An incision is made 6·25 centimetres (two and a half inches) long from the edge of the acromion down towards the insertion of the deltoid and is placed in front of the shoulder. The incision is carried through fat, skin and deltoid fascia and then the deltoid fibres are separated to gain access to the roof of the thin-walled bursa. The roof can be opened and inspection and palpation made of the bursa. Carnett says:

> It cannot be too strongly emphasized that calcareous deposits normally are found beneath the floor of the bursa and not in the bursa itself . . . unless the surgeon is aware of that fact he is apt to miss the deposit entirely.
>
> The deposit can usually be seen or palpated through the floor of the bursa. Incision through the floor frequently enters the deposit, but often the floor can be incised and peeled back and further incision made into the underlying supraspinatus tendon before entering the deposit.

The entire deposit should be removed by spooning it out with a blunt curette and a drain is inserted through the deltoid for two or three days.

Conclusion.

"Painful shoulder" is a term used to denote a condition in which the patient suffers from acute or chronic pain in the region of the subdeltoid bursa. It must be borne in mind that pain about the shoulder may be a manifestation of very different pathological conditions. Of the various affections made manifest by pain in this region there is one that is supposed to arise from trauma, especially occupational trauma of the supraspinatus tendon, which is subject to a bruising or pinching between the greater tuberosity and the acromion or the coraco-acromial ligament. A deposit of calcium may form in the tendon and this deposit has been thought to be the cause of the pain. As, however, the same painful symptoms may arise when the calcium nodule is not present, or the calcium nodule may be present and yet there may be no painful symptoms, it is doubtful what part the calcium plays in the production of the pain in "painful shoulder."

Reports of Cases.

TWO ACUTE EAR CONDITIONS.

By THOMAS G. MILLAR, M.B., B.S. (Melbourne), F.R.C.S. (Edinburgh), D.L.O. (London),
Oto-Rhino-Laryngologist, Infectious Diseases Hospital, Melbourne; Assistant Oto-Rhino-Laryngologist, Melbourne Hospital.

Case I.

E.S., AGED twenty, had double otorrhœa since childhood. On October 11, 1929, there commenced pain in the left ear and left side of the head associated with vomiting, giddiness and weakness in the legs, so that he had to retire to bed. This became steadily worse and on October 19 it was decided to operate. Previous to this he had not attended any ear specialist regularly, nor had any special examination been made. Otological examination revealed a foul smelling discharge from the left ear, a posterior perforation with granulations showing therein and slight tenderness over the mastoid process. With a Bárány box in the right ear he could not hear a shout with the left ear; there was spontaneous nystagmus to the right and spontaneous past pointing to the left. The fistula test gave a positive result. A radical mastoid operation was performed on October 19, 1929. A chronic cholesteatomatous otitis was present and there was a fistula into the lateral semicircular canal. The dura of the middle fossa and of the lateral sinus was exposed and found healthy.

For four days his condition was satisfactory and during this time his temperature was not above 37·2° C. (99° F.) and his pulse was not above 90. During the night of October 23 there was a sudden onset of severe headache, vomiting, restlessness, neck stiffness and meningeal type of cry. The temperature rose to 40·5° C. (105° F.) and the pulse to 100. Lumbar puncture revealed turbid cerebro-spinal fluid under increased pressure. The pathologist's report was: "Cerebro-spinal fluid loaded with polymorphonuclear cells; no organisms seen; no growth on culture." On October 24 a Neumann's labyrinthectomy was performed. There was purulent fluid in the vestibule; the dura of the posterior fossa was punctured and there was a copious escape of turbid fluid. On October 25 his condition was very comfortable and his temperature and pulse were falling. On October 28 temperature and pulse were normal. In the subsequent three weeks his wound healed and when last seen in April, 1930, he was well and the operation cavity was lined with epithelium and was dry.

Comment.

Before operation the condition was one of chronic suppurative *otitis media* and *interna*. The suppuration in the internal ear had apparently destroyed the cochlear function, but since there was some function remaining in the vestibular portion, the labyrinth was not touched at the first operation. Subsequently he developed a meningitis and was apparently saved by labyrinthectomy and drainage of the posterior fossa. The meningitis was of the more favourable type in that no organisms were found in the cerebro-spinal fluid by direct examination or culture.

Case II.

During the first week in April, 1930, P.T., aged nine, developed a bad cold and subsequently an *otitis media* which burst spontaneously. On April 7 he had pain in the left ear, slight mastoid tenderness, and the temperature was 37·8° C. (100° F.). There was poor drainage through a small anterior perforation, so that a paracentesis was done posteriorly. On April 9 the condition was not improved and the temperature had risen to 39·4° C. (103° F.). A simple mastoidectomy was performed, the dura of the lateral sinus was exposed and had a normal colour and appearance. There was no pus in the mastoid cells, but hyperæmia and softening of the cell septa. Eight hours after his return from the theatre he had a rigor and the temperature rose to 40° C. (104° F.). His condition during the next twelve hours was serious and he had signs of meningeal irritation. On April 10 the wound was reopened, the lateral sinus incised and found thrombosed throughout 7·5 centimetres (three inches) of its extent. Free bleeding was obtained at each end of the incision in the sinus and the latter was plugged with iodoform gauze. Finally, the internal jugular vein was tied above the facial vein. From April 11 to 14 his general condition improved, with evening temperature not above 37·8° C. (100° F.), and there were fleeting joint pains. On April 15 the evening temperature was 40° C. (104° F.) and the pulse rate 140. There were no cerebral signs. From April 16 to 24 he remained in a similar condition with typical septicæmic chart: evening temperatures between 38·9° C. (102° F.) and 39·4° C. (103° F.) and pulse rate 120 to 130. The local condition was improving all the time and there were no cerebral signs.

On April 19 blood culture revealed hæmolytic streptococci. On April 24 he received an intravenous injection of one cubic centimetre of 5% "Acriflavine" solution. On April 25 the evening temperature was 37·8° C. (100° F.). On April 26 the evening temperature was normal and remained so until May 2.

On May 2 the evening temperature was 37·5° C. (99·6° F.) and on the next evening 37·6° C. (99·8° F.).

On May 4 he received another intravenous injection of one cubic centimetre of 5% "Acriflavine" solution. Subsequently his recovery was uninterrupted.

Comment.

This was a case of latent sinus thrombosis secondary to acute *otitis media* and mastoiditis. When the local disease was arrested, he was left with streptococcal septicæmia. This was apparently cured by intravenous injection of "Acriflavine" solution.

PARALYSIS RESULTING FROM ARSENICAL POISONING.

By V. C. BYRNE, M.B., Ch.M.,
Medical Superintendent, Kingaroy District Hospital, Queensland.

P.L., AGED forty-seven, was admitted into the Kingaroy District Hospital on March 20, 1930. There is nothing

relevant in his personal history. He has had no previous illnesses. He was born in Queensland and always engaged in stock work. Three years ago he was employed in destroying prickly pear with a solution of arsenious pentoxide which he used to spray on to this plant. After three days at this work he developed continuous pain in the hands and forearms and would always feel worse at the end of his day's work. After a few weeks at this work he noticed his left knee becoming weak, then his right knee and left forearm developed similar weakness. After finding that his legs could carry no weight, he decided to gain admission into hospital.

The blood gave no reaction to the Wassermann test. On examination he showed complete paresis of the left deltoid muscle and slight contractions only in the biceps and muscles of the forearm. He had less power in both muscle groups of the lower extremities. His knee jerks were both absent. The specimens of the patient's hair of his head were sent to the laboratory in Brisbane and arsenic was definitely found therein.

After complete rest in bed and application of heat to the affected muscles, a slight degree of power returned. He was then subjected to electric massage and passive movements. Although the tone of his muscles responds positively to electric test, his recovery is extremely slow.

Reviews.

THE STORY OF MEDICINE.

AN ambitious work to be attempted only by a Gibbons or a Dickens flows from the pen of Dr. Haggard.[1] Here we have the historian and the student of humanity combined. That much research has been done is evident, that much matter has had to be omitted is proven by the 393 pages only. Not that one can cavil at the value of those pages filled as they are with worthy material well portrayed, but that the story of the science of healing from medicine-man to doctor cannot be told in that time. Rather is the book a review of the history of the science of healing with special reference to the progress in obstetrics and gynæcology as indications of the advance of civilization.

The work is divided into six parts. In Part One, "The Conquest of Death at Birth," the author sets out his hypothesis: "The position of woman in any civilization is an index of the advancement of that civilization; the position of woman is gauged best by the care given her at the birth of her child." "The care of the child-bearing woman is the index of the civilization of the community as a whole and not alone of the leaders of the civilization." He spares no blows where he deems the cause to merit them, as when he records the fact that the United States ranks nineteenth from the top in the twenty civilized countries which record the proportion of mothers and children who die at childbirth. With his general enunciation so clear, words would but labour the point.

Touching only on the highlights of history, he brings us from primitive and native races to the ancient Greeks and to the peak of ancient midwifery exemplified in the work of Soranus who in the second century after Christ did podalic version. Not until the revival of this procedure in the sixteenth century was mediaeval midwifery raised to a par with that of the ancients.

Down through the centuries, hampered often by ignorance and superstition, trammelled with theology's demands for attention to the spiritual more than to the physical, civilization slowly worked its way in the history of midwifery to our time and the awakening of a true obstetric conscience. Here again, at the end of this part, the United States is plainly spoken to as only a true patriot and a humanitarian can speak.

Part Two, "The Story of Anæsthesia," outlines the discovery of and progress in anæsthetics. Again we find that same hindrance to advancement raised by ignorance in the guise of religion.

Part Three deals with the progress of surgery. In two chapters we see glimpses of history, 2000 B.C. to A.D. 1929, with the salient points of progress well expressed.

"The Passing of Plague and Pestilence" takes four chapters to make the next part of the book. Preventive measures supply the theme. Pestilence and moralists provide a chapter well worth the reading. The temptation to quote is strong at this place. Dr. Haggard's views are refreshing.

His conclusion of this part advocates the treatment of the problem of venereal diseases as independent of the problem of prostitution—"an attempt to unravel the medical thread from the moral snarl."

"The History of the Healing Art," Part Five, provides a critical survey of the many "arts" employed from early times to the science of our day.

In Part Six, "Medicine Through the Ages," the author finds ample scope to elaborate his theme and draw his conclusions that medicine and civilization advance and regress together. Intellectual courage and humanity must prevail against bigotry and obscurantism.

Written for a wider than the medical public, Dr. Haggard's book has yet an appeal to every member of the profession. It will supply him with many thoughts tending to the betterment of civilization. Probably it may engender a desire to study the history here so lightly touched.

The work is charmingly illustrated with over 150 illustrations from old etchings and drawings. The author should not have introduced controversial matter into his "legends" to plates. The plate at page 347 is described as the last in a series—"The Harlot's Progress"—by Hogarth. Rouquet, Hogarth's own inspired interpreter, finishes the tragedy with this picture, but completes the series with "The Funeral" as the farce or after piece. Certainly this latter piece can belong to no other series. The block-maker appears to have erred in the plate facing 378. All the figures depicted here are left handed, suggesting that the negative has been reversed.

[1] "Devils, Drugs and Doctors: The Story of the Science of Healing from Medicine-Man to Doctor," by Howard W. Haggard, M.D.; 1929. London: William Heinemann (Medical Books) Limited. Royal 8vo., pp. 427, with illustrations. Price: 21s. net.

OPHTHALMOLOGY FOR THE GENERAL PRACTITIONER.

NUMEROUS books on ophthalmology for general practitioners have appeared during the last ten years. This demonstrates the need for such, and the desire of ophthalmologists to supply this need with clearly written accounts of the ocular disorders most commonly met with in general practice. As the older books pass through new editions, they become enlarged and often less attractive to the busy general practitioner. So it is to the newer books that such a man will look for help. "Affections of the Eye in General Practice," by Lindsay Rea, is the latest arrival.[1]

It is interesting to compare the various ways in which different authors tackle the problems of teaching ophthalmology. Rea writes as if he has had considerable practice in teaching. There are chapters on the disorders of each tissue in the eye and of surrounding parts, as well as chapters on ocular injuries, and on the ocular lesions which occur in diseases of the nervous system. The last chapter in the book is of particular value. It deals with the hygiene of the eye, a subject neglected in the past.

The author when discussing chalazia or meibomian cysts, refrains from referring to the part usually played by eye strain as a cause. The importance of this is proved by the manner in which an accurate correction of refractive errors will arrest the development of such cysts, even though a series of them has existed. One of the most necessary points in the treatment of styes is the instruction

[1] "Affections of the Eye in General Practice," by R. Lindsay Rea, B.Sc., M.D., M.Ch., F.R.C.S.; 1930. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 163, with seven coloured plates and thirty-three other illustrations. Price: 10s. 6d. net.

to the patient not to tie the eye up. Time after time a crop of styes has followed such an action. The author wisely stresses the fact that eyes should not be tied up if there is any discharge from the lids. His treatment of mucopurulent conjunctivitis is rather elaborate, and instead of saying: "If the case is not doing well, it is because the patient is not carrying out the doctor's instructions properly," it would at times be wiser to say that it was because these instructions were being carried out and the natural resistance of the conjunctiva was receiving both insult and injury.

It is unwise in writing a book for the general practitioner not to standardize the method of stating the strengths of drops and lotions used. The author at times refers to "grains to the ounce" and at other times to percentages. This practice explains why there exists a doubt in the practitioner's mind regarding the strength of such drops as silver nitrate, and he debates: "Is it four grains to the ounce or 4%?" The serious result of using the latter strength is seen from time to time. Especially in teaching students, strengths should always be expressed in a similar way, either in percentages or "grains to the ounce."

The author has done well to simplify the differential diagnosis of iritis and glaucoma. It is questionable, however, whether it is wise to lead the student to believe that "primary glaucoma is produced by the pressure of the lens, which gradually increases in size during life." Why need practitioners "regret that they did not learn to feel the tension of an eye while in the ophthalmic wards at hospital," when they with a little concentration can learn in their own practices the feel of a normal eye?

This book has a definite value and we look forward to its second edition. Then we shall hope to find rectified such unusual spellings as haloes, installation instead of instillation, hyoscene for hyoscine, and fluorescin for fluorescein.

There is a tendency for the author to dilate on his own unusual experiences instead of describing average conditions. This tends to mislead the beginner. The reports of slit lamp findings, gold chloride staining and of atypical conditions could be omitted, and a clearer description be given of such clinical methods as the easiest way to insert ointment under the lids. The reader should be warned not to adopt the author's plan of carbolizing a corneal ulcer after the instillation of a single drop of 5% cocaine. He should also be informed that though the description of the probing of an infant's "tear duct" is simple to read, it should be put into practice only by those who have been taught by those skilled in such treatment. Other like omissions like these are of such importance that one cannot recommend the medical student or the busy practitioner to rely implicitly on the teachings of this book.

The author has with much skill illustrated the book with drawings and coloured plates. The book is well printed and its general appearance does credit to the publishers.

CLINICAL PHYSIOLOGY AND MATERIA MEDICA.

THE fact that "Physiological Principles in Treatment"[1] has run to six editions in twenty-one years, proves that it is constantly fulfilling a demand for a small readable summary of physiological work which has withstood the effects of time and criticism, and which has a clear clinical application.

The first author who up to the present has solely been responsible for the text, is well known as a sound thinker and experienced teacher. This is proved by the fact that many views expressed in the earlier editions, though revolutionary at the time, are generally accepted today. Owing to the rapid strides in applied physiology which have occurred during the last six years, this edition is larger and has needed more thorough revision than any of its predecessors. To this end the original author has sought the collaboration of his assistant teacher, Dr. R. Hilton.

These authors, not forgetful of the fact that their book is intended to make the busy practitioner remember and apply his physiology, have still succeeded in confining such a wide subject into a small portable volume. Every page is packed with sane advice and criticism, but nevertheless put in simple and readable terms. "Physiological Common Sense" would be an equally applicable title, and the unofficial advice to read it given to candidates for London examinations could be well passed on to Australian undergraduates and postgraduates.

It is difficult to be sure which section should merit the most praise. The restrained and healthy scepticism manifested in the first chapter on organotherapy, combined with descriptions of the definite and proved spheres of usefulness for such endocrine principles as thyreoid, pituitary, adrenalin, parathormone and the recently isolated three ovarian hormones, leaves no place for any others on the physician's prescription. The chapter on the "Rational Treatment of Gastric Disorders" thoroughly justifies its title, and the student will find this section is a necessary corollary to the bare remarks of the text book. The description of treatment of visceroptosis and disorders of gastric secretion is full of useful tips along sound physiological lines. One could undertake the treatment of diabetes with confidence with no further guide than the chapter on this subject. Recent work on jaundice, uræmia and cerebral circulation is sufficiently discussed and sound warnings are made against perpetuation of the older views on intestinal intoxication and gout. A rational plan for the use of "Atophan" is set down and purin metabolism is reviewed. Disorders of cardiac rhythm and calcium metabolism, asthma, cyanosis, hepatology all find an adequate place. Certain widely discussed views on some of these subjects are necessarily omitted and a few typographical errors remain. For instance, "ascetic fluid" in the abdomen would not give rise to much spiritual satisfaction. The work, however, can be read and reread and should be within the reach of every consulting-room chair or student's stool; altogether an eminently readable potpourri of clinical physiology and *materia medica*.

[1] "Physiological Principles in Treatment," by W. Langdon Brown, M.A., M.D., F.R.C.P., with the collaboration of R. Hilton, M.A., M.B., M.R.C.P.; Sixth Edition; 1930. London: Baillière, Tindall and Cox. Crown 8vo., pp. 474. Price: 10s. 6d. net.

Notes on Books, Current Journals and New Appliances.

A MASTOID WOUND RETRACTOR.

IN *The Lancet* of June 28, 1930, Dr. W. M. Mollison describes and illustrates a simple self-retaining mastoid wound retractor. It is curved in such a way that when the jaws are in position, the shafts and handles lie against the head of the patient out of the way. It is fitted with a cam ratchet which maintains the jaws at any desired width. The instrument is made by Messrs. Down Brothers, Limited, of London.

LIP READING.

M. E. GOOD has written a small book entitled "Hear with Your Eyes by Reading Word-Forms on the Face."[1] The different consonants are taken in turn according to their several types, the manner in which sounds are produced by their aid is explained and illustrations of each group are given. By study of this book it would be possible to lay a useful foundation for ultimate proficiency in lip reading. The constant scrutiny required by such a study would be useful in training the powers of observation.

[1] "Hear with Your Eyes by Reading Word-Forms on the Face," by M. E. Good; 1930. London: Methuen and Company Limited. Crown 8vo., pp. 48, with illustrations. Price: 2s. 6d. net.

The Medical Journal of Australia

SATURDAY, AUGUST 30, 1930.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract from a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

A HYDATID REGISTRY.

In his remarkable book on hydatid disease Professor Dew has pointed out that all the ætiological factors of importance combine in Australia to perpetuate the echinococcus species. The distribution of hydatid disease in Australia follows the sheep distribution. Professor Dew found that in Victoria one in-patient in every 294 suffered from hydatid disease; this figure did not include patients operated on by country surgeons. For South Australia Professor Dew's figures are one in 388; for New South Wales they are one in 345; for Queensland, one in 2,900; for Tasmania, one in 457; for Western Australia, one in 1,000. In many instances these figures are admittedly incomplete, but when it is remembered that such large numbers of the people of the Commonwealth crowd into the cities, the extent of hydatid infestation of the country community will be realized. Since the proportion of sheep in New Zealand per head of population is 15·3, as compared with 13·0 for Australia, the sister Dominion must be regarded as being concerned in the question as vitally as the Commonwealth. These two countries are prominent among the infested areas of the globe, and their peoples are the only English speaking communities among which hydatid cysts are at all common.

Most medical practitioners in the Commonwealth have seen hydatid cysts in various parts of the body; they have found difficulty in diagnosing their presence; they know that associated pathological changes may mask the true nature of the condition; they know that, even with the application of laboratory tests, when hydatid infestation is suspected, and when the cyst is the only lesion present, diagnosis may still be in doubt; no tactile sense is unfailingly erudite, no laboratory test is without fallacy and no judgement infallible. If every human hydatid infestation in Australia and New Zealand were investigated, recorded and correlated, it would be possible to reduce the number of mistaken diagnoses, to obtain some indication of the significance of fallacious laboratory findings in certain sets of circumstances, and to cultivate in the minds of medical practitioners a more reliable judgement. A move is shortly to be made in this direction. Some of the Fellows of the College of Surgeons of Australasia resident in New Zealand have suggested to the Council of the College that a hydatid registry be established. The suggestion has received the approval of the Council and no time is to be lost in making a start. The members of the New Zealand Committee in charge of the investigation are Sir Louis Barnett, of Otago, Dr. H. T. D. Ackland, of Christchurch, and Professor F. Gordon Bell, of Dunedin; Dr. Roland A. H. Fulton, of Dunedin, has been appointed Registrar. Uniform record forms have been prepared and are ready for circulation; they will be sent to medical superintendents of all hospitals in Australia and New Zealand and will be available for all medical practitioners. This scheme is not one for the College of Surgeons of Australasia only; it is intended to embrace all medical practice in Australasia. Forms may be obtained from Dr. Fulton at 2, Pitt Street, Dunedin, New Zealand, from the Honorary Secretary of the College of Surgeons of Australasia, 6, Collins Street, Melbourne, and from the office of this journal. Forms on completion will be sent to Dr. Fulton and it is hoped that adequate follow-up notes will be obtained.

The Hydatid Registry will surely be successful. Possibly the idea was suggested by the Registry of Bone Sarcomata, founded in America some years

ago; this organization has been most useful and has done more than anything else to reduce to some sort of order the chaotic classification of sarcomata and to renew interest in their study. Similar happenings may be expected in Australasia. Medical practitioners have, as we have shown, abundant opportunities for the study of hydatid disease. Every privilege has its price. In this instance the price is the perfection of knowledge; the hydatid registry points the way. Perfection of knowledge will result in better diagnosis, in standardization of treatment and so in reduction of mortality which is at present far too high. A more important effect will be increased attention to prophylaxis.

Current Comment.

ENCEPHALOGRAPHY.

THE advances made during the last decade in the diagnosis of intracranial lesions have been largely due to the introduction of minor neuro-surgical and Röntgenological procedures. Since Dandy in 1918 and Bingel and Wiederoe in 1920 introduced methods whereby the spaces within the brain and between the brain and its membranes which are normally filled with fluid, can be filled with air and thus made to cast a shadow on exposure to the Röntgen rays, ventriculography and encephalography have been employed in many different parts of the world and their diagnostic value has been established. Several other methods have been tried in an attempt to render the intracranial cavities opaque to X rays. "Lipiodol" introduced by Forestier has been used in two forms, (i) the descending which has a heavier specific gravity, and (ii) the ascending which has a lighter specific gravity than the cerebro-spinal fluid. It can be introduced through the ventricular, suboccipital or lumbar routes; but its chief value lies in the diagnosis of blockages in the spinal canal. Mackeddie, of Melbourne, described its use at the congress in Sydney last year. Sicard and Hagenau have tried the intraspinal injection of five cubic centimetres of "Lipiodol" *ascendens* mixed with five cubic centimetres of cerebro-spinal fluid freshly withdrawn from the patient. They obtained satisfactory encephalograms, but the reactions were severe. They also succeeded in obtaining Röntgenograms of the cerebral venous sinuses, following the injection of five cubic centimetres of "Lipiodol" into the superior longitudinal sinus during compression of the internal jugular veins, without pain or danger. Monis and Lima have advocated yet another method of rendering the cerebral vessels within the skull visible on the X ray film, namely, by the injection of five cubic centimetres of a fresh sterile 25% solution of sodium iodide into the internal carotid artery of one side and then the other, followed by an immediate instantaneous exposure in each case. All these procedures are discussed in a recent article by Bernhard Badt.[1] Owing to lack of general experience in their use, he does not consider them to be as valuable as encephalography nor to give such useful and safe information.

There are three routes by which the ventricular system and subarachnoid space with its cisterns may be filled with air, namely, ventricular, suboccipital and lumbar. Each route has its own particular advantages in selected cases, but the best pictures are obtained after lumbar filling. This method has the added advantages of simplicity in technique and apparatus, the most important point being to maintain the patient in a sitting attitude and to have an excess of fluid drawn off over air injected by at least ten cubic centimetres. At Frazier's clinic in Philadelphia a special chair has been constructed in which the patient is fixed during the whole procedure; and a special attachment is fitted to the needle for a manometer so that the pressure of the cerebro-spinal fluid may be kept constant during the injection of air. In average cases, to obtain satisfactory results, seventy to one hundred cubic centimetres of fluid should be withdrawn for lumbar, fifty cubic centimetres for suboccipital and twenty to thirty cubic centimetres for ventricular filling. The chief disadvantages of the lumbar method are the length of time required to replace so much fluid with air and the severe headaches which may result from the extent of the area filled. Its use is, however, absolutely contraindicated in lesions of the posterior fossa and where there is increased intracranial tension.

In such cases, and in all others where the ventricles have not filled, ventricular puncture must be resorted to, either of the anterior, posterior or descending horn of one or both lateral ventricles, each requiring a slightly different technique. The advantages of ventriculography are that during its performance the size and position of the ventricles can be estimated, and by the injection of dyes their communication with each other and the *cisterna magna* can be readily determined without the injection of any air; furthermore, should any untoward signs of intracranial pressure occur later, the air can be withdrawn. The disadvantages are hæmorrhage which may be caused by the needle in the brain substance, and œdema of the brain following the trauma. At Cushing's clinic in Boston, ventriculography is resorted to only when all other means of arriving at a diagnosis have failed, and then only when the surgeon is prepared to proceed upon the findings obtained. Increased intracranial tension and optic neuritis are definite contra-indications.

Encephalography by the suboccipital route is similar to that by the lumbar route, except that

[1] *Deutsche Medizinische Wochenschrift*, September 6 and 13, 1929.

the fluid must be sucked off with a syringe, because in sitting patients a negative pressure exists in the cerebello-medullary cistern. This fact is made use of by Emdin who makes his patients strain two or three times after the needle has been introduced, when the air is heard to rush in. It has the advantage of requiring less air to give satisfactory pictures than the lumbar method, but its disadvantages are many and it is not recommended. Among the complications met with during the performance of encephalography are headaches, sudden collapse and vomiting. Various unpleasant after-effects have been noted, especially severe headache, vomiting, pyrexia and mild meningitic signs, all of which are usually transient. Should signs of increasing intracranial tension follow, the air should be removed by ventricular puncture or lumbar puncture in the Trendelenburg position; in milder cases the rectal administration of 25% magnesium sulphate solutions or the intravenous use of 25% hypertonic saline solution or 50% glucose solution is usually sufficient. In Badt's clinic two sudden deaths occurred three days after encephalography, but whether *"post hoc"* or *"propter hoc"* was not certain.

Among the various pathological findings met with non-filling of the ventricles after lumbar or suboccipital injection of air comes first and points to a block between the ventricular system and the subarachnoid space in the vicinity of the foramina of Magendi and Luschka; such a finding, however, should always be confirmed by ventricular puncture and dye introduction. The various causes for such a block are usually intraventricular tumours, cysts and inflammatory processes, especially in the middle and posterior fossæ. Next in importance comes asymmetry in the position or in the size, or in both, of the lateral ventricles and their horns. Unilateral failure of a ventricle to fill should always be regarded with suspicion until confirmed, and when repeated next day, the encephalogram may reverse the findings. Dilatation of the ventricles points to internal hydrocephalus: if manifest after lumbar filling, it is called *hydrocephalus communicans* and is due to a block where the brain stem passes through the opening in the *tentorium cerebelli*. *Hydrocephalus e vacuo* is due to a generalized atrophy of the brain, and large amounts of air are seen over the cerebral cortex. Occasionally a ventricle may be displaced towards the side of the lesion in cases of localized softening of the brain and cicatrization following inflammatory processes; but usually the displacement is away from the lesion, as occurs in cases of tumour and hæmorrhage. Finally, it should always be remembered that encephalography must be regarded in a similar manner to radiography applied to other parts of the body. Encephalograms must be interpreted along with the general clinical findings.

As a therapeutic agent encephalography also plays an important rôle, especially in persistent headache where it probably acts by freeing subarachnoid adhesions; in genuine epilepsy the fits have sometimes disappeared or been relieved after its use. Buchanan, of Sydney, has reported some successes by these means. Good results have been claimed in *status epilepticus*, temporary improvement has also followed in cases of postencephalitic Parkinsonism and certain authors advocate its use in acute intoxications such as *delirium tremens*. A word of warning should be uttered. In every branch of medicine new procedures are done to death. Unless great caution is used, the present advocates of encephalography will bring it into disrepute.

STAPHYLOCOCCI AND DISEASE.

THE paper by Dr. Burnet and Dr. Kellaway on staphylococcal toxins published in this issue will be read with interest by all who wish to understand the nature of disease caused by staphylococci. Their conclusion that large amounts of staphylococcal toxin can be elaborated in the human body and that this toxin will cause death in the manner described by them in laboratory animals carries with it a significance that must be realized by medical practitioners. The staphylococcus is ubiquitous and its ubiquity may perchance give rise in the minds of medical practitioners to a conception of what may be called symbiotic tolerance. Staphylococci occurring on the skin are apt to be manifest as a contaminating organism in many laboratory examinations. In these circumstances they generally have a low virulence and do not appear in great numbers. When they are responsible for a septic infection, the picture is different. The deaths at Bundaberg alone show the virulent nature of a staphylococcal septicæmia.

The protean manifestations of staphylococcal infections are well illustrated by a series of articles appearing in the May, 1930, issue of *Guy's Hospital Reports* and already noted in these pages on July 19. Study of these articles will be well repaid. John A. Ryle in the introduction makes some comments that are particularly useful. He points out that it is usual for the sequelæ of staphylococcal fever to be separately considered. He goes on to state that our understanding of enteric fever and of pneumonia would be much less satisfactory if we were to subdivide them into a number of separate diseases in accordance with their local and special types of complication. It would thus be much more satisfactory if staphylococcal fever were regarded as a specific fever. Under this title Ryle includes all the immediate febrile consequences that may complicate a boil or carbuncle, together with their metastatic accompaniments. Undoubtedly such a point of view will lead to a better understanding. "Benign" invasion of the blood stream will lead to a single metastasis such as is found in the renal cortex with secondary perinephritis or perinephritic abscess, in the lungs, the skin, the muscles or the prostate gland. A severe form will result in a septicæmia or pyæmia.

Abstracts from Current Medical Literature.

MEDICINE.

Focal Infection.

J. E. POTTER AND H. A. GARRISON (*Journal of the American Medical Association*, March 8, 1930) consider intestinal autointoxication is a definite entity that must be coped with in many cases of stubborn constipation and intestinal stasis. The colon is a site of focal infection and has a direct bearing on acute and chronic non-gonorrhœal infections of the genito-urinary tract. In such colonic focal infection, this condition has to be eradicated, preferably by methods to change the intestinal flora in order to subdue or eradicate the offending pathogenic organism, before the genito-urinary infections can be definitely cleared up. The intestinal flora can be changed to normal by regulating the diet, by administering viable potent cultures of acidophilus milk by mouth for from three to six weeks and by implantation of colon bacilli by the rectum following colonic irrigations. They consider a more definite and fuller cooperation should exist between the urologist and the gastro-enterologist in order to cope with any non-gonorrhœal genito-urinary infections that may probably have their origin in the colon as the definite site of focal infection.

Psittacosis.

THOMAS HORDER AND A. E. GOW (*The Lancet*, March 1, 1930) discuss the records of nine patients suffering from an influenza-typhoid-like illness in regard to which the association of a sick and dead parrot seemed significant. Two of these patients died. The authors remark that the striking changes in both fatal cases were in the lungs. A thin layer of fibrinous exudate was present over the greater part of both lungs of the first patient. Small hæmorrhages were present beneath the visceral pleura. A number of areas of consolidation were noted. There was no breaking down of lung tissue. The upper two-thirds of the left lower lobe and the right upper lobe of the lungs of the second patient were for the most part solid. In both lobes there were grey asbestos-like areas, mostly granular to the touch, surrounded by a bright red margin. The spleen in both was slightly enlarged and the other viscera showed cloudy swelling and congestion. The histological study of the changes in the lungs demonstrated that the main condition was a bronchopneumonia. The authors conclude that the study of the cases hitherto reported under the provisional name of psittacosis together with these nine cases points to the fact that there is a septicæmic form of disease in human beings closely associated in causative fashion with disease in parrots and kindred birds. The most important clinical features noted were epistaxis early in the disease, the tendency to diarrhœa with collapse and the special liability to pulmonary complications towards the end of the first week. Extreme variability in the severity of the disease appeared to be an important feature. The worst cases occurred in patients over thirty years of age. In the differential diagnosis between psittacosis and influenza it must be remembered that should pulmonary signs occur within the first three days, the diagnosis of influenza is more probably correct. The enteric group and generalized tuberculosis must also be considered in the differential diagnosis. It is suggested that the incubation period of psittacosis is not less than ten days.

Treatment of Blackwater Fever.

THE use of more alkalis in the treatment of blackwater fever is advocated by J. Forbes (*Kenya and East Africa Medical Journal*, September, 1929) who believes that the hæmolysis is due to a toxin of an acid nature. In all his cases of blackwater fever a source of focal infection could be found. It is conceivable that a ferment due to hæmolytic bacteria in the septic focus may prepare the erythrocytes for hæmolysis by the acid toxin. The urine of all patients treated by Forbes was strongly acid. He takes this as an indication of the acidosis generally. The patient should be kept at absolute rest and provided with a plentiful supply of fresh air. A soap and water enema is given at the outset and enemata of a weak solution of potassium permanganate are administered twice a day. Boiled water but no food should be given until the urine is clear for three days and is alkaline in reaction. Alkali is given according to Maclean's formula for the treatment of gastric and duodenal ulceration, that is, 1·25 parts of bismuth oxycarbonate, 2·5 parts of sodium bicarbonate and 5·0 parts each of heavy magnesium carbonate and calcium carbonate. One flat teaspoonful of the powder is administered every two hours from 6 a.m. until 10 p.m. when a double dose is given. If quinine is necessary, the tincture of cinchona in small doses is best. Since instituting this method of treatment, the author has had only one death among his blackwater fever patients. Death was due to persistent vomiting with consequent inability to absorb the alkali.

Gastric Photography.

J. HEILPERN AND O. PORGES (*Klinische Wochenschrift*, January 4, 1930) describe a photographic apparatus with which they have been able to take pictures of the interior of the stomach. A full account of the camera and the introducing apparatus is given. The camera is protected by a rubber shield which is ingeniously removed after introduction into the stomach. The sound must be introduced and withdrawn in a red light to avoid fogging of the films. The difficulty of determining later the exact site photographed is partly overcome by using a screen and the X rays when making the exposures. Pictures of the œsophageal end of the stomach and the pylorus are difficult to obtain, nor can the apparatus be brought close to an hour glass contraction or stenosis. However, radioscopic examination in these cases is generally sufficient. If food be present or an excess of secretion, these must be removed by lavage before the introduction of the tube. It has mainly been used for the diagnosis of gastritis. The procedure takes two to three minutes and is without harm to the patient. The article is illustrated with several films of normal and abnormal gastric mucous membrane.

The Prognosis of Pleurisy with Effusion.

J. STIASSNIE (*Revue de la Tuberculose*, April, 1930) discusses the prognosis of sero-fibrinous pleurisy, both primary and as a complication of an established pulmonary tuberculosis. He analyses the case histories of ninety-three patients who have had an undoubted tuberculous pleurisy from two to twenty-four years previously. In three of these an acute form of pulmonary tuberculosis followed immediately. In fifteen others, after a lapse of time varying between seven months and fourteen years, fresh manifestations of tuberculosis appeared, in two cases in the kidney, in the others in the lungs. Seven of these patients have died, while the others are either in good health or have signs indicating present activity of their disease. Three patients developed a purulent effusion, one dying and the others being apparently cured. Thus the incidence of secondary tuberculosis in ninety-three patients who have had pleurisy with effusion, has been 22·5%. In a second category the author reviews the histories of six patients in whom pleurisy with effusion has occurred during the course of pulmonary tuberculosis. In one there resulted a temporary improvement, but a subsequent relapse and death. In the other five patients, however, the pleurisy marked a definite turning point, the patient, despite a stormy few weeks, showing steady subsequent improvement, with no pulmonary advance. In only one patient did the effusion occur on the affected side and improvement could not therefore be attributed to the effects of compression of the lung. The author regards these "beneficent pleurisies" as indication of the favourable response of the patient's defence mechanism.

Injections of the Upper Respiratory Tract and Pulmonary Disease.

I. R. SMITH (*The Canadian Medical Association Journal*, February, 1930) draws attention to the importance of the recognition of infections of the upper respiratory tract as an ætiological factor in producing pulmonary disease. There are two routes which connect the accessory sinuses with the

lungs and bronchi, the lymphatic route and the bronchial (inhalation) route. The following symptoms may be produced by disease in the upper respiratory tract: Cough, postnasal discharge, loss of weight, general weakness, rise of temperature on exertion, expectoration and anæmia. In a series of 1,510 patients studied by the author, 166 proved to be tuberculous, while the remaining 1,344 were diagnosed as non-tuberculous. The majority of the non-tuberculous patients suffered from chronic bronchitis or bronchiectasis. The physical findings are enumerated. In a large number of cases the pathological manifestation was found in the base of the right lung. The radiographic findings vary considerably, the most frequent finding being a haziness and thickening of the bronchial shadow from the base to the hilus on the right side. Sometimes, however, the picture is one of infiltration of the upper lobes similar to that found in tuberculosis, except for the absence of the beading and mottling common in that disease. The following conditions of the upper respiratory tract were found: Deviated septum, sinusitis, ulceration of the nasal mucous membrane, diseased tonsils, enlarged tonsils and adenoids, elongated uvula, granular pharynx, pyorrhœa and various conditions of the larynx. The author stresses the fact that sinus infection and acute bronchitis may be produced by the same cause, such as influenza, and that failure of resolution in the sinuses may result in the bronchial condition becoming chronic. It is suggested that the lack of vitamin *A* may be a contributing factor to the poor resistance in some infections.

Pulmonary Tuberculosis in Children.

HENRY B. CHADWICK (*The New England Journal of Medicine*, May 29, 1930) gives an account of that form of tuberculosis which results from a first infection with tubercle bacilli giving rise to lesions in the lung and associated tracheo-bronchial lymph glands and which has been recognized in America as a clinical entity, under the caption of "childhood type of tuberculosis." This is differentiated from the adult form in that the lesion develops in non-sensitized tissue, it may be localized in any part of the lung, the associated hilar glands are always involved and the lesion usually becomes calcified, the prognosis being good. The adult type is the result of reinfection, the localization is apical, without involvement of glands; excavation and fibrosis are the end result and the prognosis in children is poor. In the symptomatology of this childhood type undue fatigue is the most common complaint, cough and loss of weight being relatively unimportant. Physical signs are of little value, but an X ray examination is indispensable, as a positive diagnosis cannot be made without it. In the differential diagnosis bronchopneumonia, bronchiectasis, pulmonary abscess, Hodgkin's disease, enlarged thymus, neoplasm and mediastinal abscess have to be considered. The most important step in treatment is to prevent further infections. The other essentials are rest, fresh air, suitable food and sunlight. Though the prognosis is usually good, these lesions are a source of danger during adolescence. Boys and girls below the age of twenty who are known to have the childhood type of tuberculosis, should be safeguarded, avoiding strenuous exercise and competitive games, as healing is a slow process, taking many years to perfect.

Climatic Bubo.

D. IVAN GRACEY (*Malayan Medical Journal*, December, 1929) describes Hanschell's treatment for climatic bubo and reports three cases in which the method was used successfully. Climatic bubo is usually of venereal origin and is characterized by enlargement of lymphatic glands in one or both groins. The glands exhibit a tendency to break down and suppurate, leaving discharging sinuses. The surgical treatment has many drawbacks. During treatment by Hanschell's method the patient is confined to bed. The prepuce is cleansed daily with 90% methylated spirit and the bubo is aspirated if pus is present. One hundred million killed bacilli of the enteric group are injected intravenously; after an interval of three or four days a further injection of two hundred million bacilli is given and again after a similar interval a further three hundred million may be necessary. Three doses are sufficient in most instances. The author used mixed typhoid-paratyphoid *A* and *B* vaccine in his three cases. His patients were discharged cured from nine to twelve days after admission to hospital. Improvement which seemed to depend on the severity of the reaction, occurred in twenty-four hours after the first injection and was accelerated with each subsequent injection.

Local Treatment of Leprous Ulcers.

MILTON C. LANG (*Indian Medical Gazette*, May, 1930) favours the use of iodoform in the local treatment of ulcers due to leprosy. The use of iodoform powder was very popular among the native lepers at the Chandkuri Leper Homes, but as much of the drug was wasted and as it appeared to be of doubtful value, its use was discontinued. At this the patients complained bitterly, declaring that iodoform was the one drug which eased their pain. In order to prevent waste, the author commenced using iodoform in solution, believing that its good effects would be rather psychological than local. He found that ulcers cleared up more quickly and caused much less pain when treated by this method. For the usual ulcer a solution of three to four grammes of iodoform to 100 cubic centimetres of acetone is applied on alternate days; for the sloughing variety, absorbent cotton soaked in a 10% solution of iodoform in eucalyptus oil is packed into the ulcer every day. The author believes that rest, aseptic treatment and exposure of the ulcers to the sun's rays would be ideal treatment, but under the conditions existing at the Chandkuri Homes such treatment is impracticable.

Polyneuritis.

B. T. BURLEY (*New England Journal of Medicine*, June 12, 1930) discusses the 1930 type of polyneuritis. Fifty-five patients with polyneuritis were admitted to the Worcester City Hospital between April and June 12. Similar cases were reported throughout the United States of America. The only apparent common factor was that in nearly all instances a fluid known as Jamaica ginger had been ingested in varying amounts. A sense of coldness, tingling or muscular fatigue was noted in the legs for a day and was promptly followed by paralysis of the anterior tibial muscles in both legs and pronounced ataxia. In all severe cases within a week paralysis of the intrinsic muscles of the hand and of the extensor muscles of the forearm occurred. The reaction of degeneration was noted in affected muscles in serious cases. Sweating and cyanosis of the limbs were frequent and minor changes in vibration and deep muscle sense were recorded in some instances, but pain, temperature and tactile sensations were unaffected. Tenderness of the calf muscles on deep pressure was a common sign in the second and third week, but no objective paræsthesia occurred as in alcoholic neuritis. The Achilles and plantar reflexes were lost and the wrist jerk in some instances, but the knee jerk was present. Otherwise the nervous system was unaffected and as a rule no other signs of disease were found. Investigation of the spinal fluid and blood yielded no results of value. No children were attacked and there were nine male patients to one female patient. They mostly had foreign names and were moderate alcohol users. There was no evidence as to the cause of this widespread polyneuritis which was apparently easily differentiated from other nervous lesions. The well known causes of polyneuritis could be readily excluded.

Nematode Larvæ in Pleural Effusion.

HEITOR P. FROÉS (*Journal of Tropical Medicine and Hygiene*, January 15, 1930) reports finding nematode larvæ in fluid obtained by aspiration of the pleural cavity. The patient died next day of cardiac failure. Larvæ were found *post mortem* in pleural and pericardial effusions and in the blood of the lungs. Great numbers of larvæ were found in the intestinal contents. A careful search of the intestinal mucosa failed to reveal an adult worm. The larvæ were identified as *Strongyloides stercoralis*, the adult forms of which actually live and deposit their eggs in the substance of the intestinal walls. The fact that these larvæ were rhabdoid would appear to indicate that they came, not through the skin, but from the intestines *viâ* the blood stream.

Special Articles on Diagnosis.

Contributed by Request.

IX.

ACUTE OTITIS MEDIA.

THE importance of early diagnosis and correct treatment in acute *otitis media* cannot be overestimated. When we consider the social and economic disadvantages that the neglected "running ear" leaves in its trail, we are appalled by the casual methods of treatment which still persist. The acutely inflamed ear, with its potential danger to life and its inevitable sequelæ of partial or complete deafness, is probably one of the greatest menaces in modern times. Owing to the fact that a number of acutely inflamed ears end in spontaneous recovery and that there is nothing spectacular or catastrophic in the great majority, the "running ear" has become accepted as one of the unavoidable ills of mankind and very little notice is taken of it. Insidious in its progress and with its dangers masked, it is only perhaps after years of neglect, when the discharge becomes noticeably offensive or the deafness pronounced, that the medical man is consulted.

One wishes that the medical profession could be completely exonerated from blame, but when patients are seen that have been treated for months and years with drops, powders, syringing *et cetera* under the advice of the family doctor, one fears that it is very necessary to condemn this practice. What medical man would himself submit to such treatment, indefinitely prolonged, too often with no result, and yet the lives and economic value of our patients ought surely to rank as equal in importance to our own. It is unfortunately a common occurrence to find children at the age of sixteen years and about to enter a trade or profession, debarred from doing so owing to irretrievable disability caused by chronic middle ear discharge, which could and should have been cured soon after its inception. The Government medical examination of school children has done and is doing untold good in the prophylaxis and actual treatment of middle ear disease, and by the prevention of invalidism from this trouble is saving the State many times the cost of the department as well as fitting innumerable future citizens for the struggle of existence.

Acute *otitis media* is usually divided into two groups—the catarrhal and suppurative. With the former we have no concern in this paper; I purpose therefore to confine my remarks to the latter condition only. A clear conception of the continuity of the mucosal lining of the Eustachian tube, middle ear, *aditus* and mastoid cells is necessary to trace the progress of inflammation and its regression. The middle ear is normally drained through the Eustachian tube into the naso-pharynx, and inflammatory changes in the tube need be very slight to prevent this drainage. Once drainage is blocked, the infection tends to extend rapidly up the tube to the middle ear. The middle ear itself is not a roomy cavity and is extremely narrow laterally, so that very little mucosal swelling is needed before the middle ear is divided into two or more compartments. The *aditus* suffers similarly and any swelling of its mucosa will shut off the mastoid cells from the middle ear. Thus we see that once the mucosa is infected, its reactionary swelling completely destroys the normal drainage of the whole middle ear cleft and the progress of the inflammation will depend upon the degree of virulence and the measures taken to restore drainage.

The common cold, especially in some epidemic forms, tends to cause acute *otitis media*. The various infectious diseases, particularly scarlet fever, show a marked predilection for the middle ear. The surfing season, with its propulsion of fluid from the post-nasal space into the Eustachian tube, due to forcible blowing of the nose, causes a definite increase in this type of illness during the summer months. Infants are particularly susceptible, due to infection of the mouth and pharynx during teething. The possibility of purely abdominal symptoms in infants should be remembered and the examination of the ears in such cases must not be neglected.

A careful review of the history of the patient is often of the greatest help. A preceding cold or sore throat, swimming or douching the nose, trauma *et cetera* will tend to put us on our guard. The local conditions are very often misleading and can easily lead us astray. Probably the greatest difficulty is met with in furunculosis. The distribution of tenderness in the soft tissues immediately in front and below the auricle, particularly with enlargements of the preauricular gland, with localized swelling of the external auditory canal and intense pain on movement of the auricle, are in favour of furuncle. Diffuse swelling of the external auditory canal is common to both. A view of the tympanic membrane is often impossible owing to this swelling. A point which is often of great help in the diagnosis is a test of the hearing. A small aural speculum is inserted and careful cleaning of the canal is effected down to the drum head. With the speculum in position the hearing in the affected ear can be tested both with the watch and the whispered voice. If the hearing is normal, the condition is almost certainly a furuncle; if the hearing is defective, careful inquiry must be made as to the presence of any previous deafness, otherwise we may wrongly come to the conclusion that the middle ear is involved. If a clear view of the tympanic membrane can be obtained, the condition of the light reflex, the visibility of the malleus and its short process, the injection or otherwise of the drum, will show us if any swelling of the drum head is present. The electric otoscope has lightened the burden of the general practitioner to a very large extent and has given him an instrument of precision which he has wisely made full use of. Bulging of the postero-superior wall of the meatus near the tympanic membrane is pathognomonic of mastoid involvement and gives the external auditory meatus a typical funnel-like appearance which is very distinctive. The temperature is generally raised in acute *otitis media* and normal in furunculosis. The pain is misleading; both conditions are extremely painful and although various differences have been described, I have never found them of much use. The maximum points of tenderness in furuncle have already been described. Although apparent mastoid tenderness is present, it differs in several important respects from true mastoid inflammation. In furuncle the mastoid tenderness does not increase with the pressure. It tends to be distributed over the whole of the mastoid and is more marked very close to the posterior fold of the auricle. It is absent or slight on tapping the mastoid. In *otitis media* the tenderness increases definitely with the pressure of the examining finger. There are two definite points of maximum tenderness, (i) immediately over the mastoid antrum, (ii) over the bony tip. Tapping the mastoid will often elicit exquisite pain which has escaped detection during the pressure test. One must always examine both mastoids at the same time, corresponding areas must be tested simultaneously so that differences in tenderness can be noted. It must be remembered that deep pressure on a normal mastoid will cause a considerable degree of discomfort. Swelling and œdema over the mastoid are common to both. Pitting of the mastoid in furuncle is very often present and must be read in conjunction with the other signs.

X ray examination of the mastoid is of extreme value in showing us what is taking place in the depths of the mastoid bone. In all acutely inflamed middle ears there is a corresponding degree of inflammation in the lining of the mastoid cells. A skiagram will show us at this stage what may be termed a "cloudy swelling" of the mastoid cells, the bony trabeculæ are, however, quite distinct and only the mucosa is swollen. As the disease advances and the mastoid becomes the seat of definite pus formation, the X ray picture shows a distinct change. The bony framework is destroyed in various areas with resultant "misty-looking" patches, a clear indication that necrosis of the bone is present.

The importance of X ray pictures is very clearly shown in the so-called atypical mastoiditis due to the *Streptococcus mucosus*. In this condition the drum head may be

only slightly affected and the acute condition has definitely subsided. In the course of two or three weeks pain, fever, general malaise, tenderness to pressure or percussion, increase in the leucocyte count and particularly an increase in the polymorphonuclear count make us suspect that all is not well; an X ray examination will show us a very marked destruction of the mastoid cortex.

Other points to be remembered in the diagnosis of acute *otitis media* are referred pains due to malignant disease of the naso-pharynx or larynx, impacted upper molar or wisdom teeth and the simulation of mastoid disease in hysterical patients.

In the early stages of acute *otitis media* we attempt to arrest progress of the disease by immediately confining the patient to bed. Purgatives, light diet, inhalation of medicated steam vapours, instillation of nasal drops and a hot bag to the affected ear will help in a considerable number of cases to check the inflammation.

Inspection of the tympanic membrane should be made at least twice a day; the degree of swelling and redness and any increase in deafness must be particularly noted. Increasing intensity of pain is a very valuable symptom, particularly if accompanied by increasing tenderness over the mastoid antrum or tip.

Paracentesis must be performed early and thoroughly and must be repeated daily if necessary. A general anæsthetic, preferably ethyl chloride, is essential, as the procedure is too exquisitely painful to be carried out under any local anæsthesia. The object of paracentesis is to drain the middle ear. Unfortunately the incision tends to gum over and drainage ceases; it is therefore supremely necessary to repeat our paracentesis, no matter how often. Drainage can be proved by making the patient perform Valsalva's experiment. As long as air or pus can be blown out of the tympanic opening we are satisfied that our drainage is effective. Rapid subsidence of pain, temperature and tenderness of the mastoid may be presumed with the establishment of free drainage. Cases, however, persist, showing that the mastoid is too deeply involved and will not recover without further operative interference. Briefly, the indications for opening the mastoid are: (i) Continuance of abundant discharge, of pain and mastoid tenderness; (ii) continuous temperature with or without further elevation; (iii) increase in the lymphocyte count; (iv) X ray picture showing necrosis of the mastoid trabeculæ.

May I utter a word of warning in the use of sedatives or analgesics which may tend to mask the degree of pain. Probably our most reliable guide when all the other signs are perhaps confusing, is the persistence or increase of pain in the ear.

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British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Medical Society Hall, East Melbourne, on June 4, 1930, DR. VICTOR HURLEY, the Vice-President, in the chair.

Staphylococcal Toxins.

DR. F. M. BURNET read a paper by himself and Dr. C. H. Kellaway entitled: "Recent Work on Staphylococcal Toxins, with Special Reference to the Interpretation of the Bundaberg Fatalities" (see page 295).

DR. C. W. ADEY said that he wished to congratulate Dr. Burnet upon the exceedingly interesting paper which they had just heard. Particularly interesting to him (Dr. Adey) was the demonstration of the fact that the killing toxin, the skin-irritating substance and the hæmolysin ran parallel one to another. In gas gangrene toxin it was not so. He had been engaged for some time in the preparation of gas gangrene toxin at the Commonwealth Serum Laboratories and he had found that the production of hæmolysin at times bore very little relation to that of the killing toxin. He had found that the most convenient experimental animal for the titration of a gas gangrene toxin was the mouse. He used the intravenous method of injection. The technique of this procedure was neither difficult nor new. Those of the laboratories staff who dealt with the staphylococcal toxins, had also employed it and had found it give consistent results. They had obtained a staphylococcal toxin of which 0·0166 ($^1/_{60}$) cubic centimetre was a "certainly fatal" dose for a mouse of twenty grammes weight. By immunizing a horse they had secured an antiserum of which 0·0042 ($^1/_{240}$) cubic centimetre would neutralize one such "certainly fatal" dose.

For this immunization they had used alternate injections of killed staphylococci and of staphylococcal toxin. The toxin had been prepared by the "pressed agar" method which had been introduced to them by Dr. Kellaway. This method of immunization had proved vastly superior to those which had previously been tried. The antihæmolytic unitage of the serum so obtained was very high indeed.

DR. C. H. KELLAWAY said that he had not devised the agar method of manufacturing toxin and although the field covered by Dr. Burnet's work had been explored before, there was no record in the literature of any staphylococcal toxin having been produced of more than one-tenth the activity of Dr. Burnet's.

In other toxins, for example, the snake venoms, there was evidence that all their activities were not due to one and the same antigenic substance.

DR. T. CHERRY expressed his appreciation of the great amount of work represented by Dr. Burnet's paper and of the solid foundation created by it for further advances in connexion with the action of pathogenic organisms. There was evidence in the reports on the Bundaberg cases that the symptoms and the fatal results were due to toxins elaborated after the injection of the infected mixture, otherwise the fatalities would have had more definite relationship to the ages of the children.

One group of children received two minims and the other group four minims. One of the children who received two minims, the youngest of the series, recovered and others of this group survived longer than some of the older children. The facts indicated that a dose of four minims was fatal and two minims not fatal for adults. The staphylococci were probably growing in clumps and the actual dose of organisms might not be directly proportional to the size of the injection. For the same reason wide deviations occurred in attempting to give doses of 50,000 tubercle bacilli in mouse experiments.

DR. F. V. G. SCHOLES said that prior to the Commission's report and, speaking almost purely from the clinical point of view, he had had a doubt as to the possibility of a staphylococcal toxin having caused such rapid death in a large number of children. It was difficult even now to account for the fact that the children could be divided into two groups, one dying rapidly and the other recovering with a localized abscess. No metastases and no kidney abscesses were found. The toxin was an exceedingly powerful one, producing rapid death in rabbits, but the effects on monkeys was negligible and on guinea-pigs slight.

Dr. Scohles thought that Dr. Cherry was in error in assuming that the possibility of flocculation or clumping had not been thought of by the Commission, as it had been considered, and it had been thought that the different results could not be due to variable susceptibility. It had been generally assumed that from one cause or another the children had received very varying doses of bacteria. It was possible that, with the development in the knowledge of antitoxic therapy, the opinion would be formed that the possession of an antitoxic immunity was not such a desirable thing as was at present supposed. He congratulated Dr. Burnet on his very excellent paper.

DR. VICTOR HURLEY thanked Dr. Burnet for his very able and lucid exposition and expressed the hope that the work would lead to further experiments yielding knowledge of great clinical value.

In reply Dr. Burnet said that there were still some missing links in the chain of evidence regarding the Bundaberg staphylococcus. It had less toxin-producing power than some other strains used. The toxin which caused the deaths, was certainly produced *in vivo*, otherwise certain animal experiments with the contents of the infected bottle would have yielded more definite results. The staphylococci might have lost some of their toxin-producing power owing to subculture. When staphylococci were given intravenously, in no case had the animal recovered. Some had died after about a week with abscesses in the kidney substance, others had died in about seventeen hours, a rapid death from multiplication of organisms in the tissues producing toxins locally or in vital tissues such as the brain or heart in spite of the presence of antitoxin in the circulating blood.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Broome, Kenneth Hamilton, M.B., B.S., 1920 (Univ. Sydney), 69, Shirley Road, Roseville.
Cramp, John Francis, M.B., B.S., 1925 (Univ. Adelaide), 7, Grafton Street, Woollahra.
Hardman, Robert Roderick, M.B., 1900 (Univ. Sydney), Mental Hospital, Rabbit Island, *viâ* Brooklyn.
Wilson, Francis Henry Hales, M.B., 1928 (Univ. Sydney), Coast Hospital, Little Bay.

The undermentioned have been reelected members of the New South Wales Branch of the British Medical Association:

Murphy, Robert Joseph, M.B., M.S., 1918 (Univ. Sydney), c.o. Messrs. Murphy and Moloney, 79, Elizabeth Street, Sydney.
Bray, Gordon Wolseley, M.B., M.S., 1914 (Univ. Sydney), 283, Elizabeth Street, Sydney.

The undermentioned have been elected members of the Victorian Branch of the British Medical Association:

Walker, Ellen Sarah, M.B., B.S., 1926 (Univ. Melbourne), Queen Victoria Hospital, Melbourne, C.1.
Stonham, John Geoffrey, M.B., B.S., 1928 (Univ. Melbourne), Melbourne Hospital, Melbourne, C.1.

BRITISH MEDICAL ASSOCIATION PRIZE.

THE Council of the British Medical Association proposes to award, in March, 1931, a prize of £25 for the best essay attempting to "Describe and Discuss Cases Illustrating the Modern Methods of the Diagnosis of Early Pulmonary Tuberculosis." The essay must be written by a final year medical student or by a registered medical practitioner of not more than one year's standing (that is, one year from date of passing of qualifying examination). The competitor must be studying or must have studied at one of the medical schools in the British Empire outside the British Isles.

The prize will be awarded to the author of the essay deemed by the examiners to be the best sent in, but if no essay received is considered by the examiners to be deserving of a prize, no prize will be awarded.

The essay, which should not exceed 5,000 words, should be clinical in nature and must include concise notes of cases, up to, say, three, personally observed by its writer.

Essays should be plainly written or typed on foolscap paper (one side only) and must reach the Medical Secretary, British Medical Association House, Tavistock Square, London, W.C.1, not later than January 12, 1931. Each essay must be signed by a pseudonym only and be accompanied by a signed and dated statement that the essay has been the *bona fide* work of the competitor and that he or she comes within the definition of those eligible to enter for the competition, together with his or her full name, pseudonym, address, medical school, and (if on the Medical Register) month and year in which final examination qualifying for registration was passed.

The essays received will be adjudicated on by examiners appointed by the Council from among members of the Association. The decision of the Council shall be final.

Correspondence.

IRITIS.

SIR: In the interesting article on iritis contributed by Dr. J. C. Halliday to your issue of August 2, he advises the use of atropine as a help in the diagnosis of a doubtful case of iritis. Subacute glaucoma is a disease which may simulate iritis, and has often been confused with it. If atropine is instilled in such a case, disastrous consequences will follow. For this reason in all doubtful cases the greatest caution should be exercised in the use of a mydriatic. Even "Mimatropine," whose action is much less persistent than that of atropine, should be used sparingly and neutralized by eserine, if no unequivocal signs of iritis are evoked by its use. I have always been in the habit of teaching students never to use atropine in cases of eye disease unless they have already diagnosed iritis.

Yours, etc.,

EDWARD L. GAULT.

4, Collins Street, Melbourne.
August 4, 1930.

MEDICAL CERTIFICATES.

SIR: The letter from Dr. Purdy published in your issue of the second instant concerning among other things the caligraphy of the medical profession is deserving of a better fate than the fear of the writer, that it will have little effect.

Every medical man in the practise of his profession is called upon to issue certificates and a proportion of these relate to the death of their patients. If a doctor would pause one instant and consider the importance of the document he is issuing and the possibility of its far reaching effects, it would be realized that thoroughness to a degree is a paramount necessity.

It must be known that a medical certificate does not end when the maker appends his signature. It may be that it finds its way into the Coroner's hands or that of the City Health Officer. Again, the Public Health Department may be concerned or the Registrar-General is at a loss to know what it means and it may even find its way into a court of law. A great many thousands of pounds are paid by insurance companies on such certificates and the number of employees who avail themselves of these documents is legion. What, then, is of more importance than that the medical certificate should be couched in orthodox medical terms, clear and unequivocal, and with no room for doubt in the mind of the person whose hands it falls into as to who the author is? On the one hand the terms of expression in a certificate will surely reflect to what extent the mind of the author has retained his medical jurisprudence, while on the other the handwriting is perhaps an indication of the thoroughness which may be expected of him, not only in the execution of important documents, but in all walks of life.

A man's signature may, purely out of eccentricity, be unreadable by others, but this is pardonable if a rubber stamp in block type be used as well on all documents other than cheques or promissory notes, which latter his banker will at once readily recognize and which do not seriously affect the public life of the community. It does not appear, however, that any deviation from his terms or expression or answers to questions in a certificate is permissible.

The subject I am mostly concerned with is cremation and in my capacity as an official I have been brought face to face with some alarming circumstances—incidents which through apparent thoughtlessness cause untold distress to bereaved persons who find their certificates do not comply with the act and regulations clearly stated in the form of certificates as requiring attention. Also disregard in replying to questions which by the law of the land must be answered, has caused much trouble and the medical referees to whom these certificates must be forwarded for authority to cremate, would, I feel sure, say that Dr. Purdy is extremely polite in his condemnation of carelessness and most gentlemanly in his suggestion for remedial procedure in order that posterity may benefit. It is with the present generation that there is urgent desire for reform and especially those to whom the soft impeachment of Dr. Purdy applies.

Yours, etc.,

A. LIVINGSTONE KERR,
M.D., F.R.C.S.E., J.P.

19, Bligh Street,
Sydney.
August 12, 1930.

UNCONSCIOUS HUMOUR.

SIR: Under the above heading you published eight years ago a selection made by me from the many medical certificates supplied by doctors to employees of this Department.

The following further observations on the same subject will show that even in these days we still have reason to smile.

That the doctor is as apt as the patient to seek for a cause of his malady seems clear from these examples:

"Neuritis of legs due to vibration of car."
"Parotitis and orchitis due to infection and overstrain."
"Nervous breakdown caused by straining."
"Rheumatic knee joint and sciatica due to a fall on the hip."
"Chronic nephritis and acute intestinal colic caused by strain of lifting."
"Muscular rheumatism of legs and shoulder caused by vibration of engine."
"Ptomaine poisoning caused by the effects of the rigours of active service." (Eighteen months after repatriation.)

Yet in none of the above instances is the cause suggested quite as original as that given by a night officer who wrote: "I had to be circumcised due to the heat in the new signal box here."

Some refinements of diagnosis command our admiration such as "visceral rheumatics," "elongated mesentery," "fracture of thyroid cartilage," "ruptured diaphragmatic fibres," "slight abdominal injury involving the ureter," "chill causing diaphragmitis" and "biliary neurasthenia caused by irritative occupation."

Other diagnoses are delightfully vague, such as "a bad nose," "a diseased back," "bad legs," "gastric diarrhœa," "acute debility," "ulceration of the foreleg" (from a country practitioner), "pyoria and lassitude."

The next one seems perfectly straightforward: "I have examined Mr. N. this morning, and am of the opinion that he wants a holiday for a month."

In the next case the optimistic prognosis seems to have been fully justified, as the patient lost only five days from work: "Mr. E. has been suffering from the effects of disarticulation of the articular processes of the cervical vertebræ and will be unable to resume his occupation for four (4) days at the earliest."

After mentioning a diagnosis of "psychosis barbæ of face" made by a resident medical officer of a metropolitan hospital, let me conclude with a gem in the English language written by a mere engineer. An employee named T— who had recently been injured, sent in his resignation, and the resident engineer was asked what were the reasons for the resignation, and in his reply he wrote: "Current gossip at the time credited T— with having had a love affair with a girl at M—, which had imported a certain, inevitable future consequence, which necessitated him leaving the district to escape legal parental obstriction and obstetric expense."

Yours, etc.,

T. L. O'REILLY.

Railway Department,
New South Wales.
August 12, 1930.

Obituary.

RUPERT GEORGE ST. JOHN NAYLOR.

DR. RUPERT GEORGE ST. JOHN NAYLOR whose death occurred on July 3, 1930, was the son of the late Dr. George Robinson Naylor, of Calcutta, India. He studied medicine at Edinburgh and qualified in 1887. After spending some time in the study of ophthalmology at the Middlesex Hospital, London, he returned to Edinburgh and gained the diploma of Fellow of the Royal College of Surgeons of that city. He practised in England for about eight years. During this period he found time to follow the forms of sport that he loved. He was for five years captain of the West Mersey Cricket Club. He was a keen and good tennis player and took an interest in football. He had two brothers practising medicine in Australia (one, Dr. Arthur Naylor, of Gippsland, survives him) and this fact doubtless influenced him in his decision to come to Australia.

After his arrival in Australia Naylor engaged in private practice for about ten years. He then joined the staff of the Victorian Lunacy Department as Medical Officer. First of all he was Junior Medical Officer at the Hospital for the Insane at Beechworth; he had subsequent experience at Ararat and at the Children's Cottages at Kew. In 1915 he was appointed Senior Medical Officer at Sunbury and in 1922 he returned to Beechworth as Medical Superintendent. He retired from the Department in December, 1929, on attaining the age of sixty-five years, having gained a reputation for careful and consistent work and devotion to duty. In his latter years he devoted his leisure to perfecting himself in the art of relief wood carving; he carved many large pieces of furniture for members of his family. Dr. W. Ernest Jones, Inspector-General of the Insane of Victoria, pays a fitting tribute when he writes:

> Dr. Naylor was a man of varied interests, and an ideal medical officer inasmuch as he took great interest in all the many sides of institutional life. He was respected by his staff and beloved by his patients whose interests he always kept in the foreground. His particular hobby may be said to have been the training of the nursing staff, but there was no part of his duties as Medical Officer and Superintendent to which he did not give earnest and careful consideration.
>
> His loss will be felt keenly by his family who were greatly attached to him, and by his many friends and colleagues.

ARTHUR GILLESPIE STUART GILCHRIST.

WE regret to announce the death of Dr. Arthur Gillespie Stuart Gilchrist which occurred at Sydney on August 21, 1930.

MELBOURNE MEDICAL STUDENTS' SOCIETY DINNER.

THE jubilee dinner of the Melbourne Medical Students' Society will be held at the Oriental Hotel, Melbourne, on September 11, 1930. All past members of the Medical Students' Society are invited to be present and to notify the Honorary Secretary, Women's Hospital, Carlton, of their intention before September 8. The price of the tickets is ten shillings. In view of the importance of the occasion it is hoped that all graduate members of the Society will try to make the reunion worthy of the occasion.

Diary for the Month.

SEPT. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 2.—New South Wales Branch, B.M.A.: Post-Graduate Work Committee.
SEPT. 3.—Victorian Branch, B.M.A.: Branch.
SEPT. 4.—South Australian Branch, B.M.A.: Council.
SEPT. 5.—Queensland Branch, B.M.A.: Branch.
SEPT. 9.—New South Wales Branch, B.M.A.: Ethics Committee.
SEPT. 10.—New South Wales Branch, B.M.A.: Last day for nomination of two candidates for election to Federal Committee.
SEPT. 11.—New South Wales Branch, B.M.A.: Clinical Meeting.
SEPT. 11.—Victorian Branch, B.M.A.: Council.
SEPT. 11.—Queensland Branch, B.M.A.: Surgical Section.
SEPT. 12.—Queensland Branch, B.M.A.: Council.
SEPT. 16.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
SEPT. 17.—New South Wales Branch, B.M.A.: Section of Obstetrics and Gynæcology.
SEPT. 17.—Queensland Branch, B.M.A.: Eye, Ear, Nose and Throat Section.
SEPT. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
SEPT. 24.—Victorian Branch, B.M.A.: Council.
SEPT. 25.—South Australian Branch, B.M.A.: Branch.
SEPT. 25.—New South Wales Branch, B.M.A.: Branch.
SEPT. 26.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. G. A. Brookes (B.M.A.) has been appointed a Member of the Board of Optometrical Registration, New South Wales, according to the provisions of the *Opticians Act*, 1930.

* * *

Dr. F. W. Fay (B.M.A.) has been appointed to represent medical practitioners on the Board of the Hobart Public Hospitals District, Tasmania.

* * *

Dr. H. McI. Birch (B.M.A.) has been appointed Acting Deputy Superintendent of the Parkside Mental Hospital, South Australia.

* * *

Dr. E. S. Humphrey (B.M.A.) has been appointed Medical Officer of Health by the Greenmount Road Board, Western Australia.

* * *

Dr. A. A. Altmann (B.M.A.) has been appointed Certifying Medical Practitioner and also Medical Referee at Branxholme, Victoria, pursuant to the provisions of the *Workers' Compensation Act*, 1923.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, SYDNEY, NEW SOUTH WALES: Honorary Vacancies.
UNIVERSITY OF SYDNEY, CANCER RESEARCH COMMITTEE: Radium Registrar.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Mount Isa Hospital. Boonah Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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